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Feb.-Mar. 1934 10 Cents

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POTASH HUNGRY

Typical fruit from a tree which received unbalanced fertilizer containing insufficient potash.

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THIS photograph was made on September 14. Note that although the fruit is still quite immature there is already a striking difference in quality. The quality of your citrus fruit largely depends on the fertilizer you use. **NV** Sulphate of Potash is the quality-producing element in citrus fertilizer. It will pay you to make sure that your fertilizer contains sufficient quantities of this element to produce smooth, well-shaped fruit with fine finish, high color, excellent texture and a large volume of juice and sugar. Give each tree 20 pounds of mixed fertilizer containing 10% potash, or apply four pounds of **NV** Sulphate of Potash per tree. Potash pays in increased yields and improved quality.

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

Editorial Offices: 19 West 44th Street, New York

VOLUME XIX NUMBER SIX

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SPRING REACHES THE HEIGHTS

Better Crops with PLANT FOOD

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VOL. XIX NEW YORK, FEB.-MAR., 1934 No. 6

"We have two roads to try out," says Jeff.

Plans *and* Planners

By Jeff McDermid

"ATTACHMENTS to the planter" has been a familiar phrase in the mechanics of the farming and fertilizing industry. But the rude legal phrase of the same wording, often accompanied by a "lien on the land," has ushered in a new survey of agriculture and soil fertility. Whether a soil is suffering or sufficient is a question temporarily in abeyance until the perplexities of the planter receive attention.

Two years ago the theory of the industrial renaissance took fragile shape around a newly coined word, "technocracy," which has not survived or taken vigorous root. Not so with farming. Progress has been made in "Agadjustment." Agriculture took its name from old Agricola, an expansionist of the imperial age of Roman colonization. We may emerge before long with a new prefix for the ancient and honorable craft of agriculture, with the "culture" part retained in a broader sense than before.

Agadjustment is not an attack on efficiency. It is purely a dramatization of voluntary cooperative planning, with rewards or inducements for compliance in social discipline. The planter must become a planner. In so doing he and his associates, although guided by a mutual responsibility, are in no wise asked to discount the findings of science as they are found in livestock breeding or plant and soil improvement.

AT the close of the dormant winter season when the old stirrings of farming fever come to husbandmen along with their spring tonics and seed catalogs, it is a good time to think this over. Old frenzies and free-lance competitive drives are gone, and all elements in the soil-sustaining trade must joint partnership with the New Drift which, God willing, will free us from the erosion and the hard-pan of recent barren seasons.

Involved in the problems of the present relating to fertility are the original scientific investigators, the extension field forces, the independent sales agencies, and the trial and demonstration work done with practical farmers.

Determination of hydrogen-ion concentration of soils, characteristics of colloidal material in profiles of certain distinctive soil groups, further studies in nitrogen fixation, and the evolution of new measures, new discoveries, and new tests—these are the fruits of the pure scientist. I have known many such earnest and disinterested men, retiring and reticent, but fired with fascination and zeal. Their work may rightfully continue, divorced as it usually is from the immediate clamor of commerce. The soil scientist should pursue his way undisturbed just as the milk scientist, the flour scientist, or the textile technician continues to enlarge the boundaries of knowledge and open the mysterious realms of the unknown and the hazardous. Without them the well would run dry of the "white corpuscles" which protect the blood stream of all arts and crafts from insidious enemies beyond the scope of economics to combat. There are some evils which logic or economic graphs cannot exorcise or overcome. To abandon those weapons of defense is the last thing asked for by the sponsors of Agadjustment.

I am quite aware that many of these cloistered scientists are themselves eminently practical men, who cannot help scanning the field to observe the use to which their research is put. But to many it is glory in achievement, in the satisfaction found in solutions to vital problems, that will always be like working at their art for art's sake.

We may well ask ourselves where agriculture would be today without the pioneer searching minds of valiant soil scientists whose discoveries have put us in the lead among nations in yield per man. It seems to me apparent that the answer is that we would be obliged to have more farmers instead of wondering if we have too many. Soil scientists have not erred toward progress for mankind by making it possible for each farm operator using proper soil treatment to grow more food efficiently.

THINK it over. Frustrated plans and miscalculated management in agriculture still contribute to the gamble of farming and the uncertainty in the sum total of its harvests, but if farmers had kept step with the achievements of agricultural science, fewer farmers could have supplied us all with plenty of food and been assured of a good income above costs. Your alert agricultural scientist is like the forward scholar whose progress to a higher grade is retarded by the slowness of his fellows.

But only about one farm in ten the country over accepted the newer soil improvement systems and put them into practice. The same holds true, perhaps in less measure, of livestock

(*Turn to page* 44)

Recent Developments in Fertilizing Muck Soils

By Dr. Paul M. Harmer, Muck Specialist

Michigan State College

THE advancement in the knowledge of the proper management of muck and peat soil has been very rapid during comparatively recent years. It is a far cry from those desolate wastes, which were a large factor in the North Central States in obstructing the northern movement of the prairie schooners of pioneer days, to those same areas at the present time, supporting fields of high-yielding special crops growing from highly productive muck soil. Even after our country had become well settled, those same areas of swamp and marsh land were for many years largely idle, in some sections of the Northern States often occupying a considerable proportion of the farmstead, yet contributing little or nothing in monetary returns to the owner.

While it is true that celery was first grown on muck soil near Kalamazoo, Michigan, more than 75 years ago and that peppermint was grown successfully on muck nearly 60 years ago, the commercial importance of these crops was not recognized for many years

These crops were crossed with 1,000 pounds per acre applications of different fertilizer mixtures, applied broadcast and disced in. In the foreground an 0-12-24 mixture was used; beyond that a strip was left unfertilized; while just beyond that an 0-8-32 mixture was applied. The crops from left to right are spinach, leaf lettuce, and head lettuce.

Table 1. Showing Effects of Ashes, Lime, Commercial Fertilizer, and Manure on Yields of Several Crops on a Michigan High-lime Muck Soil[1]

Plot No.	1898 Treatment Pounds per acre	Yield in pounds per plot—1899					
		Radishes	Onions	Squash	Sugar Beets	Potatoes	Turnips
1	Leached ashes 10,000[2]	29.0	0.2	5.0	93	2.2	47.2
3	Nothing	48.2	3.4	26.0	26	2.5	17.7
4	Air slaked lime 4,000	28.7	0.9	1.2	20	2.0	14.2
5	Commercial fertilizer[3] (1898-400) (2.1-11.2-1.6) (1899-200)	36.2	9.0	48.5	17.5	5.6	8.0
7	Farm manure 20 loads	87.2	19.7	195.5	124.5	7.1	92.5

[1]From Michigan Experiment Station Bulletin 181-1900.
[2]Ashes analyzed 1.43% P_2O_5; 0.36% K_2O; 26.92% CaO.
[3]A commercial mixture, having an analysis of 2.1-11.2-1.6, was applied on Plot 5 at the rate of 400 pounds per acre in 1898 and 200 pounds in 1899.

afterwards, and their fertilization with commercial mixtures high in potash content was a practice adopted much later. The discovery of the role of potash in plant nutrition and of the potash mines in Germany about the middle of the nineteenth century, together with the successful substitution of potash for farm manures by Rimpau in the early sixties, on his high-lime muck lands of southern Germany, failed at that time to have any effect on the methods of fertilization of the muck soils of this country. Farm manure continued to be the only source of plant food for more than 40 years. In fact, as late as 1900, the institution from which I write published a conclusion, based on experiments conducted in 1898 and '99, that "complete fertilizers do not give results that will warrant their purchase in considerable quantities for muck land." It is evident from some of the data that led to this conclusion, and which are given in Table 1, that the very low potash content of the mixture was at least partly responsible for the fallacy in the recommendation.

Shortly before 1900, investigations on muck land in the United States, apparently first started by the Wisconsin Agricultural Experiment Station, to be followed by others by the Experiment Stations of Illinois, Indiana, Minnesota, New York, Oregon, Michigan, and other States, showed the value of properly balanced mineral fertilizers. The great increase in their use in the last 15 years has resulted to a large extent in the displacement of manure, by commercial mixtures high in potash, in the fertilization of our muck soil. In some of the more intensive phases of muck farming, annual applications of a ton or more per acre of high-analysis mixtures are not uncommon at the present time.

Types of Muck Soils

Recent developments in the management of muck soils show that, in addition to the regular fertilization with nitrogen, phosphate, and potash, the use of other materials is sometimes necessary. In addition to the use of fertilizers, the application of such materials as sulphur, lime, copper sulphate, manganese sulphate, and ordinary salt is frequently required for the production of profitable yields of the best quality crops. In the absence of some of these materials, the crop may be a complete failure or the yield greatly decreased, even when the proper amounts of nitrogen, phosphate,

and potash are used. For that reason, the use of these added materials is considered in the following discussion.

Investigations made both in Europe and in America have shown definitely that the reaction or lime content of a muck soil is very important in determining the crop adaptation and the fertilizer needs of that soil. While in the Northern States there is considerable correlation between the reaction of the soil and the native vegetative growth, a close study of the soil is always advisable before beginning reclamation. Thus we find an abundant growth of the swamp blueberry and the leather leaf (Cassandra), the dwarf tamarack and the black spruce, definite indications of a very acid muck soil. In other cases, however, we find that the vegetative growth may be determined largely by the reaction of the surface soil and that the muck underneath may have a decidedly different reaction. For that reason we advise Michigan muck farmers, who desire to send in samples of their soil for testing, that each surface sample, taken at a depth of three or four inches in the plowed layer, should be accompanied by another sample taken at a depth of eighteen inches to two feet.

As a result of the testing of any muck sample, the soil represented by that sample is placed in one of three groups:

1. Very strongly acid muck (low-lime), pH generally 4.5 or less;
2. Not acid to strongly acid muck (high-lime), pH range 7.0 to 4.6;
3. "Alkali" muck (very high-lime), pH 7.1 or higher.

The Use of Lime

In general the muck soil belonging to Group 1 will require an application of ground limestone before satisfactory yields of most crops can be grown —the swamp blueberry and the cranberry being exceptions to this rule. The actual degree of acidity at which lime will be required apparently depends on three factors, namely, the reaction of the underlying soil into which the plant roots penetrate, the lime content of the soil, and the kind of crop which is being grown. When lime is needed, the required application may range from one to eight or more tons per acre, depending on the degree of acidity and the depth to which it extends.

The second group includes a large

Table 2. Showing Effects of Different Fertilizer Mixtures and of Manure on Yields of Several Crops on Michigan High-lime Muck Soils[1]

Fertilizer Application Rate per Acre Radishes & Onions 1,500 lbs. Sugar Beets, Potatoes, and Turnips 600 lbs.	Yield per Acre—1922					
	Winter Radishes Tons Ingham Co.	Onions—Huron Co.		Sugar Beets Tons Gratiot Co.	Potatoes Bus. Eaton Co.	Turnips Tons Ingham Co.
		Bus. Marketable	Per Cent Culls			
0-0-24	12.9	412	19.4	11.1	185	12.5
Nothing	4.1	115	44.9	8.0	56	6.7
0-8-0	7.0	497	6.0	7.6	54	5.6
0-8-24	13.6	736	4.2	14.3	259	15.9
Manure (20 loads[2] (12 loads	13.7	191	37.4	11.6	238	14.8

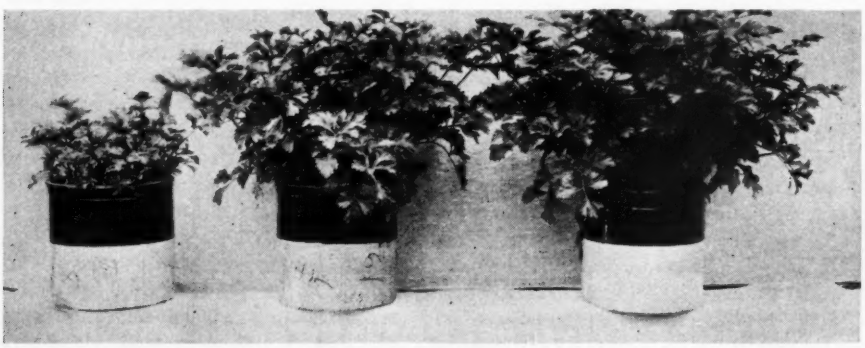
[1]From Michigan Experiment Station Special Bulletins 136 and 168.
[2]Manure application 20 loads per acre for radishes and onions; 12 loads for sugar beets, potatoes, and turnips.

proportion of our most productive mucks. If the sample of soil should fall into this group, no lime would be needed, unless, as occasionally happens, the high-lime muck is underlain by a low-lime muck in the second foot of soil. If the muck is well supplied with lime, with a reaction varying from no acidity to medium acidity throughout its depth, no lime would be needed. In fact, an application of lime would be likely to decrease yields of a number of crops that might be grown. Such a condition resulted from the application of leached ashes ($CaCO_3$ equivalent, 48.1 per cent) and of air-slaked lime on several crops in the experiment reported in Table 1, although it apparently was not recognized at the time of the experiment.

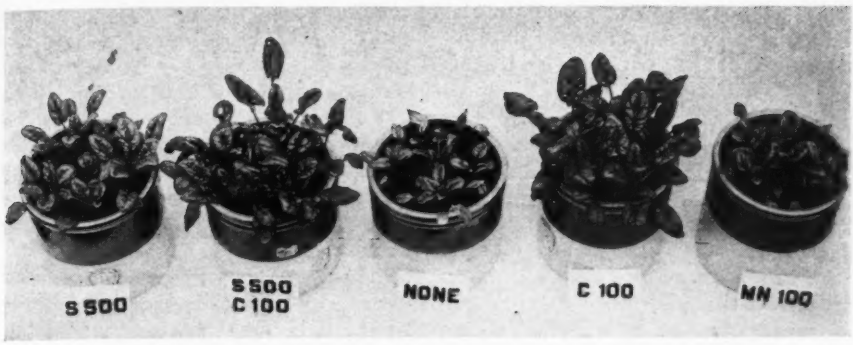
The third group of alkaline muck soils is a relatively small group, but, because of the fact that these soils are really too sweet for the production of a number of crops, we should place them in a class by themselves. Of the crops which may not do well on this soil, we should mention onions, spinach, lettuce, radishes, tomatoes, squash, and celery. If the muck is well supplied with moisture, however, the celery will do fairly well. Crops which seem quite tolerant of the alkaline reaction include sugar beets, table beets, mangels, Swiss chard, cabbage, mint, and carrots. If the soil is quite alkaline the table beets, carrots, cabbage, and potatoes, as well as many general crops, will not do so well, unless the reaction is made more acid.

The Use of Sulphur

The application of sulphur flour has been found a very effective method in correcting this unproductive condition of "alkali" muck soils. The rate of application required will depend on the degree of alkalinity and the depth to which the alkalinity extends. If the alkalinity has resulted from the burning off of the surface layer of muck soil, the alkaline reaction may be confined to the plowed layer alone, in which case the soil underneath may have an acid reaction. If the pH of the plowed layer is not higher than about 7.4, while the reaction of the underlying soil is around 6.0, it is possible to correct the toxic condition by deep plowing for a few years, so as to get the underlying soil mixed with the plowed layer, in the meanwhile growing crops which are more tolerant to the alkaline reaction. If the alkaline reaction extends to a considerable depth and the degree ranges from 7.5 to 8.0, an application of from 1,000 to 2,000 pounds per acre of sulphur flour may be required, especially if such crops as onions, celery, spinach, potatoes, and lettuce are to be grown. If the reaction becomes more alkaline with increase in depth, as is frequently true when the alkalinity of shallow muck is caused by underlying marl, an annual light application of sulphur may be needed



Celery on well-fertilized alkaline muck. From left to right the jars received (1) no sulphur, (2) 1,000 pounds, and (3) 2,000 pounds per acre of sulphur flour mixed thoroughly with the muck.



The field from which this muck was secured had a reputation throughout the large productive muck area in which it was located as never having produced a satisfactory crop. In the greenhouse these jars of spinach were uniformly given before planting 1,000 pounds per acre of a 3-9-18 mixture and in addition from left to right in pounds per acre: (1) sulphur 500, (2) sulphur 500, copper sulphate 100, (3) nothing except the fertilizer, (4) copper sulphate 100, and (5) manganese sulphate. Copper sulphate turned the trick. With this information given him, the farmer used copper sulphate in his fertilizer mixture on his onions the following year and secured a very good yield.

in addition to the heavier initial application, in order to take care of the ever-increasing alkaline reaction caused by the underlying alkaline material coming to the surface. Although it is advisable to apply the sulphur several weeks before a crop is to be grown, there is not much danger of any injury from its application even just before seeding, provided it is thoroughly disced into the soil. Sulphur should never be applied on muck soil which is already quite acid, unless blueberries or cranberries are to be grown, since the increase in the acidity may be such as to be harmful to most crops.

The Use of Copper Sulphate

The beneficial effects of light applications of copper sulphate were first reported by the Florida Experiment Station as a result of investigations with their Everglades soil. Following that report studies made by the Cornell and Michigan Experiment Stations showed similar outstanding benefits from its use on the northern muck soil. As yet the benefit from the copper sulphate is not thoroughly understood, but it appears likely that minute quantities of the copper are of actual benefit to the plant itself, possibly in some role in the photosynthesis of the plant.

In addition to a marked increase in yield, the benefits from copper sulphate include a healthier top growth of most crops, better color of all tops, as well as of the bulbs of onions and roots of carrots, together with an improved flavor of several crops, including carrots, lettuce, onions, and spinach. These benefits are largely confined to the acid muck soil. On the very strongly acid mucks, nearly all crops are benefited from its application. On the medium to strongly acid muck soils, most crops will show a benefit. On the slightly acid mucks, which have a pH around 6.0, such crops as spinach, lettuce, carrots, onions, potatoes, and tomatoes are likely to be considerably benefited, while several other crops generally will show some response. On the less acid mucks and even on the slightly alkaline mucks, spinach and lettuce may respond to the copper sulphate application.

If the spinach crop on an acid muck burns up badly in a few days of hot weather, it is a fairly good indication that copper sulphate will be beneficial on that muck. If the onion tips on the acid muck die back badly during hot weather and if the color of the mature bulbs of the yellow varieties is yellowish-green rather than the de-

sired yellowish-brown, it is quite certain that copper sulphate will improve the crop. If the carrots have a lemon-yellow rather than a rich orange-yellow color, it is also evidence that copper will help. While an application of as little as 10 pounds per acre will give a marked benefit, it is generally advisable to apply about 50 pounds per acre. The copper sulphate can be purchased mixed in the fertilizer, so that the small quantity can be uniformly applied, at no additional cost for spreading than is incurred by the spreading of the fertilizer. While both the powdered and the small granular forms of copper sulphate are satisfactory, the "snow" form mixes readily with the fertilizer and spreads uniformly on the ground.

The Use of Salt

For many years occasional farmers in the sugar-beet section of Michigan have reported that the use of common salt is beneficial to sugar beets on their upland soils. In 1924 work was started at Michigan State College to determine whether or not salt would be beneficial to crops on muck land. As a result of these several years of investigation, the use of salt, along with a fertilizer mixture high in potash, on muck land which has not been heavily fertilized for several years past, can be recommended for five crops. Four are members of the beet family; namely, mangels, sugar beets, table beets, and Swiss chard. The fifth is celery.

An application of from 500 to 1,000 pounds per acre is apparently sufficient for these crops. This recommendation applies to celery only on land which has not been heavily manured or fertilized in the past. Continued use of the salt for celery is not advisable after one or two thousand pounds per acre have been applied. If the potash in the fertilizer which has been used on a given muck in past years has been in the form of a salt-bearing kainit rather than as muriate, it is probable that none of these crops will respond to a salt application on that muck. The benefit from a salt application is not so likely to be secured on an alkaline muck as on one which has an acid reaction. Because of a slight toxicity of salt toward certain other crops, it is advisable to make the salt application just preceding the beet crop, preferably about every third or fourth year in the rotation.

The benefit from the salt does not appear to be due to any substitution of the soda in the salt for potash, but rather to an actual need for salt by these crops. While two or three of the several other crops under study have shown slight benefits from salt, the results have not been sufficiently consistent to warrant recommendations for them.

The Use of Manganese

Experiments with manganese in the form of sulphate have shown a crop response to that element on only a very small proportion of our muck soils. These are usually mucks which have an alkaline reaction, either naturally or due to the use of alkaline irrigation water or to the application of lime where it is not needed. The deficiency is evident in a chlorotic condition of the leaves, especially with such crops as radishes and spinach. Generally the deficiency can be corrected cheaply and permanently by the application of sulphur to increase the acidity, which in turn increases the availability of the soil's manganese. In exceptional cases an application of 100 to 200 pounds per acre of manganese sulphate is necessary.

The Use of Fertilizers

Of the three fertilizer constituents, nitrogen, phosphate, and potash, nitrogen generally is not so important in muck-land fertilization as are the other two, since the natural nitrogen content of high-lime muck generally ranges from two and one-half to four per cent. Because the nitrogen content of the very strongly acid muck

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Plots at Wynne, Arkansas, August 29, 1930, fertilized with 600 lbs. of a 6-8-12 fertilizer (left) and the same amount of a 6-8-0 fertilizer (right). Note increased vigor and absence of cotton wilt and "rust" in the 6-8-12 plot. There was 54 per cent of cotton wilt in the 6-8-0 plot in contrast to 21 per cent in the 6-8-12 plot.

Potash Hunger Follows Legume Hay Crops

By Dr. V. H. Young

Plant Pathologist, Arkansas Agricultural Experiment Station

IN the sandy alluvial areas of the South it is a common observation among farmers that cotton often "rusts" badly when planted on land that has previously been used for production of legumes, especially lespedeza, for hay. This observation is entirely in line with the findings of soil scientists who have known for many years that when legumes are utilized for hay, large amounts of potash and phosphorus are thereby removed from the soil. Since the "rust" of the cotton farmer is almost sure to be "potash hunger," his belief regarding "rust" on cotton following legumes seems well founded.

Work at the Cotton Branch Experiment Station in Lee county in eastern Arkansas during the past five years has shown that cotton affected with "rust" or potash hunger also becomes highly susceptible to attack by the cotton wilt fungus, and that potash applications, either in the form of kainit or muriate of potash alone or in mixed fertilizer as the particular situation demands, not only control potash hunger but also greatly reduce the amount of

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

TO the late Professor George E. Morrow should be given the credit for laying the foundations of a sound program of agricultural education and research in the State of Illinois. When he went to the Illinois Industrial University at Champaign in January 1877 as professor of agriculture, work in his line of effort was in its infancy. There was no blazed trail for him to follow, and he had to devise his own plans and methods in the face of the indifference, if not the outright opposition, of some of those whose interests he desired to further.

In those early days it was the general belief of the farmers on the broad prairies of Illinois that the fertility of the land was inexhaustible. They knew that the rich, black soil formed from the luxuriant growths of grasses, which from the beginning of time had flourished, fallen, and decayed, lay in beds four feet or more in depth under their plows, and they could not imagine that its humus and stores of nitrogen ever could be depleted.

But Professor Morrow knew better than that. He foresaw that inevitably the time would come when the ruinous policy of continued robbery of the soil's fertility would be made manifest by diminished crop returns; therefore, he began to teach and preach the sound doctrine of crop rotation, clover growing, stock raising, use of manure, and improved methods of cultivation.

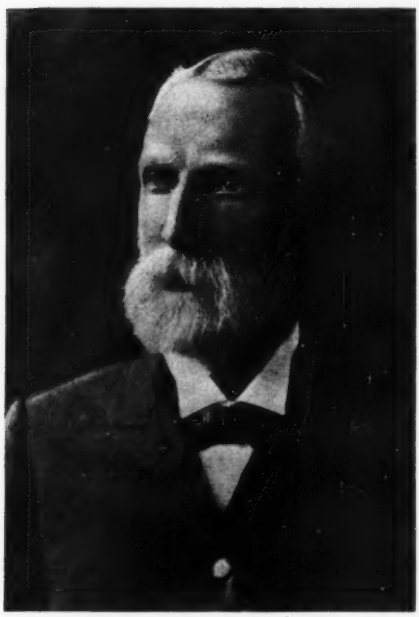
For years his wise advice fell largely upon deaf ears, and the farmers continued to belittle "book larnin," experimentation, and scientific research. Progress naturally was slow, but it was steady, and at length the effect of Morrow's pioneer efforts became apparent. Others, who splendidly continued his work under more favorable auspices, finally brought the Illinois College of Agriculture and Experiment Station, as the institution had been named in 1888, to the position of light and leading it holds today. Looking back, they are proud to acknowledge the debt of gratitude the farmers of Illinois owe to Professor Morrow.

The Morrow Plots

One of his first moves for the betterment of Illinois agriculture was the establishment of the plot system of testing the varieties of grains and forage plants, and for 53 years these plots have continued to contribute valuable facts to the knowledge of crop production and cultural methods. These plots, we believe, were the first instituted in America on an extensive scale, and the work they have accomplished must be considered well worth while, considering the records made. They set a good example for other experimenters to follow, and their plan of investigation has been widely adopted.

It was perhaps from the Rotham-

sted Experiment Station in England that Professor Morrow took his cues for the establishment of the Illinois testing plots, for he visited that celebrated institution in 1879 and derived much inspiration from the advice and example of its scientific managers, Lawes and Gilbert, who became internationally famous for their scientific research work in agriculture. In 1889 he made a second study trip to Europe, and in 1892 he visited the agricul-



Professor George E. Morrow

tural institutions of the Pacific Slope. Always, he was seeking new ideas and a fuller understanding of all matters pertaining to agricultural education; therefore, he was also a persistent student of books, reports and bulletins, besides being a prolific writer for the agricultural press and a popular speaker at farmers' gatherings in Illinois and other States.

Another creditable phase of Professor Morrow's work was his effort to improve farm animals for earlier maturity and the production of meat of better quality with less waste. He had come to the conclusion that there was no sense in feeding steers for three years or more until the carcasses became overloaded with tallow. In the eighties, and before that time, it was the common practice to market steers that were three years old and unprofitably heavy. In attaining great weight, excessive quantities of feed had to be used, so that there was little profit in the feeding process. At the same time, the consumers began to demand smaller cuts, better quality, and less rank fat. Naturally, therefore, a different type of steer and better methods of feeding had to be devised, and Professor Morrow helped materially in the work. Indeed, he was one of the chief advocates and founders of fat stock shows. Of these, the earliest was that held in the old Exposition Building on the lake shore at Chicago, Illinois.

Sponsored Baby Beeves

Professor Morrow aided in establishing the show and in making it a success. It became, in due course, the chief school for the education of stockmen, farmers, and consumers in all matters pertaining to the production and fitting of beef cattle. There, in 1880, a steer called "Nels Morris" was exhibited, at a weight of 3,125 pounds, and was shown the following year still weighing 2,900 pounds. This animal was fed for the late John B. Sherman, General Manager of the Chicago Stock Yards Company, by that grand old Scot, James Thompson, with whom the writer was well acquainted.

Professor Morrow had contended, as he told Professor W. J. Fraser of the Illinois Experiment Station, that a steer could be made to weigh 1,000 pounds at 1 year of age, 1,600 pounds at 2 years, and 2,000 pounds at 3 years, and he was right; but later he came to see that the 3-year-old was unprofitable and no longer in demand, and that ripe yearlings were most desired. The result of this early work by Professor Morrow, Alvin H. Sanders, editor of the *Breeders' Gazette,*

and others gradually led to the popularity of the "baby beeves" of today, and to a more profitable utilization of feed by steers of finer type and earlier maturity. The benefits of their work to the stock breeder, the butcher, and the consumer have been inestimable.

Native of Ohio

George Espy Morrow was born on the home farm near Foster, Ohio. His father was John Morrow, and his mother Nancy Espy, both natives of Ohio. George was the youngest of nine children. His great great grandfather was a Scot by blood, Irish by nativity, and a Covenanter in religion. He came from Londonderry, Ireland, a generation before the Revolution, and settled in Adams county, Pennsylvania, where he farmed lands that a century after his death were shaken by the guns of the battle of Gettysburg. His only son, John, also a farmer, was influential in his district and took a prominent part in local politics. His son, Jeremiah Morrow, grandfather of George Espy Morrow, left Pennsylvania in 1794 and settled in Miami county, Ohio, where he grew corn on the fertile bottoms of the Little Miami River and served usefully as a surveyor. While prominent in politics, farming was his chief employment, and he introduced Marino sheep in his locality, paying $300 for the two purebred foundation ewes for his flock. John Morrow, George Espy Morrow's father, was the eldest son of this pioneer of Ohio and became a fairly successful farmer. The parents of his wife, Nancy Espy, were neighbors of the Morrows.

A Diligent Student

George entered the common school of his home district in 1846, and was a diligent student. In 1856 he enrolled for a course of study in Maineville Academy, from which he graduated. During his school-boy days he frequently made trips with his parents to Cincinnati, 20 miles away. Two horses drew the carriage, or the wagon when supplies had to be purchased. His grandfather was President of the first railroad running out of Cincinnati; was the first and for 10 years the sole representative to Congress from Ohio; and also had served his State as Governor. Another drive George took with his father was to Columbus, Ohio, where in 1839 his grandfather had laid the cornerstone of the State Capitol.

After graduating from Maineville Academy, young Morrow taught in that school during 1858, and again in 1860 and 1861. Then came the Civil War. He enlisted in Company E, 2nd Ohio, as a private of volunteers and soon was made a corporal. Having been wounded at Perryville, Kentucky, where a rifle bullet pierced his arm in 1863, he was discharged at Minneapolis, Minnesota, where he had been sent to recuperate his strength. Returning home for a brief visit, he then entered the Law School at Ann Arbor, Michigan; finished the course in law; and graduated March 28, 1866. During his college days he enjoyed several visits with his mother's uncle, James Espy, who was noted as a meteorologist and as the author of the book entitled "The Philosophy of Storms." Many instructive lessons on that subject were given George by that savant, who recommended him highly for his intelligent comprehension of the problems discussed.

Turned to Journalism

It was while a law student at Ann Arbor that he met Sarah Gifford of Cambridge, New York, whom he married in Detroit, Michigan, in 1867. They had a family of four children, and the writer is indebted to two of the daughters, Miss M. M. Morrow of Zenia, Ohio, and Mrs. Garrett T. Seeley of Evanston, Illinois, for much of the historical matter embodied in this sketch.

While qualified to practice law, young Morrow had a greater liking for newspaper work. When he saw

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Growing Importance of Potash in the Corn Belt

By G. P. Walker

Purdue University Agricultural Experiment Station

WHEN we note in Illinois Experiment Station Bulletin 362 that on 9 of the 11 experiment fields on light-colored soils and 4 of 15 on dark-colored soils, the soil treatment including liberal applications of potash has come to be the most profitable in the grain-farming systems, we get a new conception of the increasing importance of potash in our Corn Belt agriculture. These facts assume greater significance when we realize that 15 years previously not a single one of these fields showed such a response to any fertilizer treatment.

On practically all these fields the annual crop values for the combination of lime, residues, and mineral fertilization have been higher in recent years than those from the livestock system with sole dependence on lime, legumes, and manure for maintaining crop-producing power. With this situation extending even to some of the soils of the great Illinois prairie which the generation before us thought to have inexhaustible fertility, we have real food for thought. It

Effect of fertilizer on corn yields, Bedford Experiment Field, 1932. Each shock is the produce of one-twentieth acre.

Lime alone	Lime, phosphate	Lime, phosphate, and potash
33.7 bus. per acre	40.1 bus. per acre	55.8 bus. per acre
63% sound	80% sound	90% sound

seems fortunate that those who started out to demonstrate the permanence of a system of agriculture built on the three-cornered base of lime, legumes, and phosphate also included potash in the field-plot layout. Otherwise the "permanent" system might already be in the discard for a number of important soil types.

Indiana Corroborates

In Indiana we have a similar picture. On the Soils and Crops Experiment Farm of the Purdue University Agricultural Experiment Station, an excellent sample of good central Indiana "black and clay" corn land, the continued use of liberal applications of potash has increased the five-year spread of 2 bushels per acre over phosphate alone during the period, 1914-1918, to 19 bushels during the last five years. Some nitrogen is added with the potash in this experiment, but its importance may be discounted since it fails to give consistent or significant corn increases anywhere else on this farm.

On the black sandy loam soil of the Pinney-Purdue Experiment Field in northwestern Indiana, where little potash effect was evident in 1920, the last five years show a potash increase of seven bushels per acre over the phosphate-alone treatment. In fact the phosphate on limed land is now producing little better corn than the lime-alone treatment. On the muck experiment field in this same section, the use of muriate of potash at the average rate of 150 pounds per acre per year has been justified in the increased yields of corn, soybeans, and potatoes in the rotation by showing a greater margin above cost than half this amount. This double dose of potash with a small amount of phosphate has produced average yields of 28 bushels of corn, 7 bushels of soybeans, and 100 bushels of potatoes per acre more than the unfertilized land and the difference is increasing with the years.

In southern Indiana on the typical "gray flat" land of the Jennings County Experiment Field, average corn yields of 50 bushels per acre for the last five years with lime and phosphate treatments have been raised to 62 bushels by the addition of potash costing $1.92 per acre in the rotation. It was on this same soil type that last year's winner of the Indiana five-acre corn contest grew his yield of 141 bushels per acre with heavy applications of phosphate-potash fertilizer supplementing manure applications as a part of his soil-fertility program. On the gray-colored loamy soil of the Purdue-Vincennes farm, 32 pounds of actual potash per acre have averaged a nine-bushel corn increase for eight years.

On the Bedford farm on heavy yellowish-gray Bedford silt loam, soil phosphate was the all-important mineral plant-food for raising crop yields for a number of years. On wheat, soybeans, and clover it is still by far the most important item in raising the productive power of this rolling land in rotations where clover is used regularly. However, beginning about 1922 a definite trend in corn yields toward an increasing response to potash fertilizer began to be apparent. During the last four years the application of 36 pounds of actual potash per acre in the rotation has produced an increase of 10 bushels of corn per acre. A four-year running average curve of corn yields for the phosphate and phosphate-potash treatments shows a gradual widening of this difference, indicating that the yield response to potash will be greater as cropping of this soil continues.

A Poor Saving

Many corn fields showed lack of fertilizer the past two years in their spotted, uneven condition, with areas of stunted, off-colored, and unhealthy corn plants. This was especially true in the dark sandy loam and low-lying black soil areas bordering on muck where high ratio potash fertilizer had

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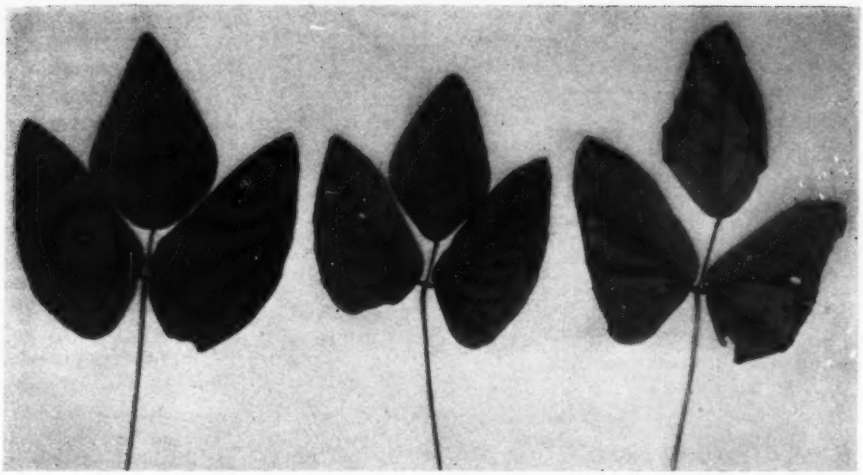

Magnesium and potash-deficiency symptoms in velvet beans. Left—normal leaf. Center—magnesium-deficiency symptoms: green veins with light green to yellowish color between veins. Right—potash-deficiency symptoms: yellowish-white color around margin which finally becomes yellowish-brown and dies around the entire leaf. The leaves are often puckered.

Some Soil Problems

Potash, Magnesium, Manganese, and Iron Needs in Coastal Plains Soils, and the Remedies

By A. B. Bryan

Editor, Clemson Agricultural College of South Carolina

IN the Coastal Plains areas of South Carolina not only truck crops but various field crops are being studied from a new angle of plant-food needs, particularly the deficiency of these soils in magnesium, manganese, potash, iron, etc. These studies are leading agronomists and other specialists to a fuller realization that changes in soil-fertility practices are bringing about decided changes in many of the soils, so that they are depleted of several of the so-called minor plant nutrients, especially magnesium, manganese, and iron.

The depletion of the available supply of these elements of plant food has resulted in almost complete crop failures in many instances and large money losses among growers of truck crops especially, and the importance of some remedial action is understood by all.

Before undertaking a discussion of this matter of minor plant foods in Coastal Plains soils, let us call attention to the latest results of studies re-

garding the potash needs of these same soils. Since the Coastal Plains areas in South Carolina and other States are important in extent and in production of corn and truck crops, it is well to hear the latest facts as to the need of corn for potash. These facts, established by Dr. H. P. Cooper, head of the Agronomy Department of Clemson College, are the more important now when cash-crop acreages are being reduced and more attention is being given to sustenance farming.

There are many situations in the Coastal Plains soils, and even in the Iredell soils of the Piedmont areas of the South, where without potash corn is often a complete failure. This is particularly true on much of the old gum and cypress swamp and savannah areas which have been drained and cropped for a number of years. Yet when potash is added to the fertilizer, these soils often produce more corn than any other land on the farm. Thus much of the potentially good corn land in the South, which is very low in available potash, is redeemed from almost complete corn-crop failure.

It is pointed out that corn and other grain crops following cotton (which is usually fairly well fertilized with a potash-containing formula) seldom show serious potash deficiency. On the other hand, the naturally low lands too wet for cotton under boll-weevil conditions have had no such fertilizer and Dr. Cooper's comprehensive tests show fine effect on corn yields of 150 pounds per acre of 14 per cent Kainit and 50 pounds of ammonium sulphate at planting time plus 50 pounds of ammonium sulphate as a side application to the growing corn. Yields of only 3.5 bushels of corn per acre without potash were jumped to 28 bushels with the potash.

The typical symptoms of this potash deficiency are a yellow color of the entire leaf blade and a dying around the margin of the leaf.

Truck Crop Troubles

With climatic conditions in the Southeastern States very favorable for production of late fall, winter, and early spring vegetable crops, a large vegetable-growing industry has developed particularly along the coast. Typical of this development are the areas around Charleston and Beaufort in South Carolina.

In the early days of this industry there was a relatively large amount of barnyard manure available for application to the vegetable crops. As the acreage of vegetable crops increased, there was less manure available for each acre of vegetables grown; therefore it became necessary to find a substitute for barnyard manure. Mixed chemical fertilizers in large quantities were used as this substitute. Formerly, mixed chemical fertilizers contained considerable quantities of organic nitrogenous com-

Magnesium-deficiency symptoms in cabbage leaf.

Left—normal leaf. Right—magnesium-deficiency symptoms: areas around veins retain their normal green color long after the area between the veins becomes bronze, yellowish-white, or almost white in color.

pounds, such as cottonseed meal, blood, and numerous other similar organic materials. The demand for some of these materials as animal food has limited their use in chemical fertilizer mixtures and they have been partly replaced by synthetic nitrogenous compounds.

Here is what Dr. Cooper has to say about the effect of these practices on some of the best truck soils:

"Use of relatively large amounts of commercial fertilizer per acre has resulted in depleting the soil of several of the so-called minor plant nutrients, such as magnesium, manganese, and iron. The addition of sulphates or chlorides results in the formation of soluble sulphates and chlorides of these metals and enhances the outgo of these metals in the drainage, particularly during rainy growing seasons. The depletion of the available magnesium and manganese through excessive leaching of these materials from acid soils has resulted in almost complete crop failures in many instances, and a large amount of potentially good truck soil has been abandoned. If these deficiencies are not supplied, still larger proportions of potentially good truck soil will be abandoned or used for the production of crops which require less intensive cultural methods. Adequate scientific assistance will enable farmers to grow profitable crops on many of the areas which do not at present grow successful crops."

Corn leaves, showing typical potash-deficiency symptoms. Left—normal leaf. Right—leaves showing stages in the development in the potash-deficiency symptoms.

Crops commonly affected by a deficiency of magnesium are cabbage, potatoes, tomatoes, beans, peas, spinach, radishes, collards, turnips, and corn. This magnesium deficiency is one of the major factors in lack of satisfactory growth of many of these crops, especially on light gray sandy soils that are low in organic matter, and Dr. Cooper asserts that this magnesium deficiency is annually costing many individual farmers in South Carolina alone many thousands of dollars each.

Since most farmers are not familiar with the magnesium-deficiency symptoms, which are very similar in various crops, it may be said briefly that the disorder is characterized by the veins of the leaves retaining their normal green color long after the areas between the veins change to a yellowish-white or almost white color. The lower leaves often, if not usually,

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Saving Hungry Soils

By C. J. Chapman

Professor of Soils, Wisconsin College of Agriculture

AN old college roommate, whom I hadn't seen for many years, dropped in on me the other day. His profession for the past 18 years has been that of ministering to a sinful world; saving souls, so to speak. My profession for the past 18 years has been that of ministering to wayward soils; I have been trying to save soils.

Saving souls and saving soils may not appear to be analogous, but when it comes right down to fundamentals, this old roommate of mine and I have been engaged in closely related fields of endeavor.

Hungry soils and hungry souls go hand in hand. As I look at the map of the State of Wisconsin, I can visualize hundreds and thousands of farmers who are just eking out an existence, where crop failures and poor yields have left them with barns and granaries empty and silos half filled. Their economic plight is directly associated with social conditions in these communities. Lack of income has made it difficult to maintain the rural churches and other institutions for social betterment. And so I argued with this old roommate that the starting point in the saving of souls is the saving of soils on our farms.

And it is not a hopeless task. There is an increasing number of farmers right in these blighted areas whose barns are well filled with alfalfa hay, who have fine herds of cattle, and who are making a good living. I have in mind right now a farmer in central Wisconsin, on light sandy soil, who in 1932 sold nearly 100 tons of alfalfa hay as a cash crop and still had enough left to feed his herd of livestock. He started liming and potashing years ago.

This man lives at Almond, Wisconsin. His name is Ed Rath. In a recent letter to me he makes the following statement: "In 1923 I started to raise alfalfa on a two-acre piece of land. I spread about 3 tons of lime to each acre and 20 lbs. of Grimm alfalfa seed per acre. The stand was very poor. The next year I turned it over and added 200 lbs. of potash. The results were very good. In 1925 I bought a lime sower and roller. That spring I sowed 20 acres of alfalfa without any nurse crop, as this was a sandy, worn-out piece of land. At present I have all of my 280-acre farm limed and 150 acres of alfalfa. I think it pays to use potash on poor sandy soil for a sure catch. In 1932 I raised about 150 tons of alfalfa and sold 91 tons and carried over 8 tons. In 1933 (due to dry weather) I had only about 50 tons, but I will have hay to sell again this spring."

Lime and Potash

There are many farmers who in recent years have applied the miracle-working stuff, marl and potash, to their hungry soils, and who have transformed sandbur deserts to waving fields of alfalfa. You ask these men the question, "How did you do it?" and their answer inevitably is, "Lime and potash."

On the sandy soils of central Wisconsin, and for the most part the sandy loams of the entire State, potash is the life-giving elixir for these run-down soils. With potash, lime, and some phosphate, we now find it pos-

sible to grow this deep-rooted, drought-resisting, long-lasting alfalfa crop that is reclaiming thousands of acres of land in this State.

But now, as I look at the map of the State of Wisconsin, I can visualize other areas where crops are irregular, spotted, and poor. I am now thinking of the areas of the level, dark-colored soils, most of them sandy loams, where, as one drives through these sections in the summertime, he sees the yellow, stunted, potash-starved fields of corn, the scant and weak growth of timothy, the fields of grain where the straw crinkles down and lodges, with very light yields of chaffy grain. Thousands of acres of this type of soil can be found in western Outagamie, Winnebago, and eastern Shawano, Waupaca, and Waushara counties. Here, for the most part, the soil is well supplied with lime, but we have found by chemical tests, and by field experiments as well, that potash is the chief limiting element to production.

We don't need to confine our travels to any particular section in Wisconsin or the Midwestern States to see evidence of potash starvation. Field after field of corn on our low bottom muck and peat soils shows this evidence of potash hunger. The stunted, yellowed, dwarfed corn, and the spotted, irregular growth of this crop on many of these fields are positive evidence of potash starvation.

Even on our upland heavier silt and clay loams we are beginning to see some evidence of potash hunger. It is true that where stable manure has been used regularly in the rotation, there is little need for potash, but unfortunately there are fields on many farms in Wisconsin that haven't seen a forkful of manure for the past 40 years. Back forties, ridge fields, and isolated tracts a long way from the buildings, where it has been difficult or impossible to haul manure, have suffered, and here the use of potash, along with phosphates and lime, is needed to bring these soils back to profitable production.

Sometimes we feel that we are not making any progress in the matter of educating and informing farmers in matters relating to the fertility of their soils, and indeed it is a long, slow, laborious process. But then when we

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125 lbs. of 0-20-20 fertilizer per acre applied with an attachment on the corn planter made a difference of a good crop and practically no crop on the two rows not fertilized. Otto Havercorn, Fond du Lac, Wisconsin, owner of the farm, says that the fertilized corn made a good 10 tons of silage per acre, well eared. The two rows unfertilized never did amount to anything. Scrubby, short, yellow, and dwarfed, with only a few nubbins. This soil is a heavy, black, high-lime clay loam.

Fertilizing the Lawn

By J. W. Turrentine

U. S. Department of Agriculture, as told to U. V. Wilcox,
Washington Correspondent and Special Writer

TOO often the lawn, flowers, and shrubs are given a moderate or heavy fertilizer treatment in the early spring and then expected, by continued watering during the drier months, to produce a maximum of foliage or flowers without regard to plant-food needs during the later part of the season. This may result in a less luxuriant growth during the fall and a weakened condition with which to go into the winter months.

The point I would make is that lawns and shrubs are constant and heavy users of plant food and their fertilization in other than spring months should be considered.

Ready Response

Well-established blue grass or other lawns may do fairly well for a few years with little fertilizer treatment, provided the soil is naturally of high fertility. Usually, however, the effect of fertilizer treatment can be seen readily very soon after the lawn is started, whether by sodding or a new seeding.

A striking illustration of this was seen recently on a newly sodded lawn in a suburb of Washington where no fertilizer had as yet been applied. A neighbor who was successfully using high-nitrogen fertilizer on his own lawn conceived the idea of making a demonstration of the value of such fertilizer by writing the street address on the lawn in question with the fertilizer used on his own lawn. It was only a few days until the color of the grass began to change and in about 10 days the street address "611" could easily be read from the roadway. The demonstration "demonstrated" the value of fertilizer treatment on the new lawn.

The need of additions of plant food for old established lawns is even more serious since the numerous mowings are usually removed from the lawn and little, if any, return of fertility made. In the case of shrubs, perennial and annual flower beds, and porch and window boxes, very little fertility is returned by leaves or dead stems, hence the removal of plant food in the course of years become considerable.

If well-rotted stable manure is available, it may be used as top-dressing for the grass in the early spring or worked thoroughly into the soil around shrubs and flowers. Manure does not contain any great amount of plant food as compared with high-grade fertilizers, but it contains the decaying organic matter and myriads of bacteria which are very helpful. The increasing difficulty of getting well-rotted manure and the danger of introducing objectionable weeds almost eliminate consideration of the use of this material in towns and cities. Because of the difficulty in obtaining good manure for lawns and plantings and the high cost of inferior strawy material, the use of commercial fertilizers is being practiced widely and with excellent results.

Use Complete Fertilizers

In making a new lawn seeding, the liberal use of a complete fertilizer containing nitrogen-phosphate, and pot-

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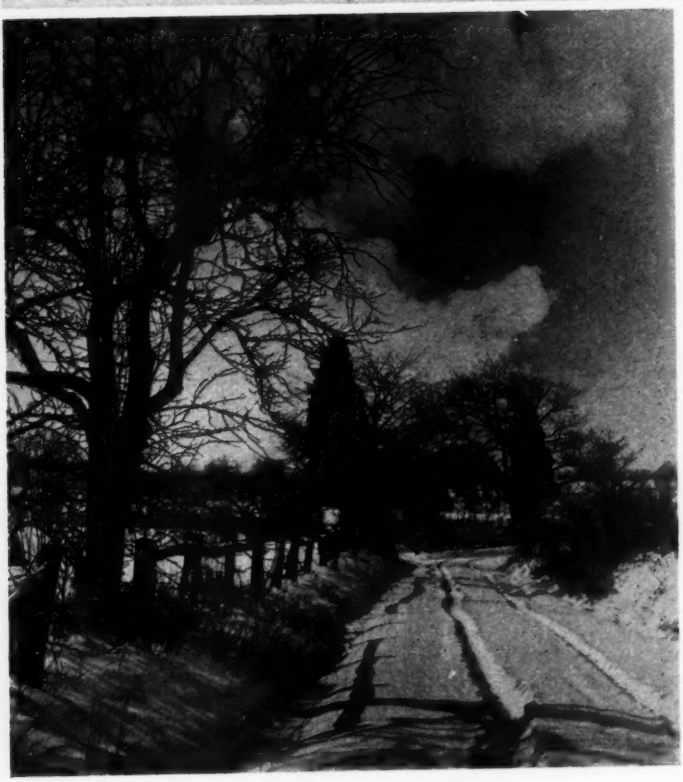
Pictorial

A SPRING LESSON

FARM

ASSETS



TOWN

and

COUNTRY

The Editors Talk

Then and Now

A year ago the outlook for farm prices was dark indeed. For 3½ years prices farmers received for their products had constantly declined and were lower than the prices of other commodities. But in February 1933 the long decline ended and in March the index of farm prices as a whole started upward. The farm situation was more hopeful; the outlook brighter. 1933 ended with the farm income approximately $1,240,000,000 more than in 1932, or an increase of 24 per cent.

What is the outlook now? In a word, while the agricultural outlook is much better than a year ago, the improvement in farm income has been uneven both as regards types of agricultural industry and as regards territories, demanding a close study of local and regional conditions in relation to all agricultural problems.

The increase in crop prices on the whole has been maintained better than the prices of some other agricultural products, as for instance the prices of beef cattle and hogs. This is shown in the following figures: In December 1932 the price of cotton was 5.4 cents per pound in comparison to 9.6 cents in December 1933. For the same period corn increased from 18.8 cents per bushel to 42 cents; potatoes from 36.8 cents to 69.4 cents per bushel; whereas in strong contrast, during the same period, the price of beef cattle per hundred pounds declined slightly from $3.41 to $3.12. Concurrently the price of hogs changed from $2.73 per hundred pounds to $2.92.

The "Agricultural Outlook for 1934" published by the Bureau of Agricultural Economics in cooperation with other agencies in emphasizing this variability notes that "The rise in individual farm-product prices has varied greatly, depending primarily upon the influence, in relation to each commodity, of currency depreciation, increase in domestic demand, and alterations in supplies."

With the suspension of gold payments in the United States, there was an immediate response in the prices of most export and import commodities. The index of farm prices of grain advanced from 36 per cent of the pre-war average in March to 94 per cent in July, while cotton and cottonseed advanced from 48 to 84 per cent. The advance in the price of export and import commodities, such as wheat, cotton, and wool, resulted primarily from the fact that, after adjustments for changes in exchange rates, prices of products entering into international trade must be approximately equalized in all countries once account is taken of transportation costs and other factors influencing the flow of these commodities in international trade.

Regarding the other group of commodities not influenced in the same degree by import and export prices, the outlook notes that "Unlike the rapid advance in prices of export commodities, most of the commodities whose prices are largely determined by changes in the level of domestic demand have advanced in price only about as rapidly as the income of urban con-

sumers." Heavy marketing has tended to check advances in the prices of some of these commodities.

Of essential importance regarding possible trends in 1934, the outlook notes that "In view of the recent marked advance in prices of nonagricultural products and the accompanying decline in prices of farm products, it seems probable that during the coming year prices of farm products will rise in relation to prices of nonagricultural products. The program of the National Recovery Administration appears to have hastened price advances in manufactured products partly as an adjustment to higher production costs. After most of those adjustments have been made, competition in the face of surplus productive capacity will probably retard price advances of nonagricultural goods to a slower rate relative to prices of farm products and other raw materials. . . .

"In summarizing these various influences on prices it appears that farmers in 1934 may anticipate a somewhat higher level of prices for their marketable commodities as well as improvement in the exchange value of their output."

This is indeed a welcome interpretation. But a note of caution is added. "It should be borne in mind that the extent and character of the price rise will be affected by future monetary and credit policies which may alter substantially the conclusions drawn from any analysis of present conditions." The outlook for an improvement in farm purchasing power is certainly much better this March than a year ago; but the fundamental fact of interdependence remains, between city and country, between one county and another. After all it is possibly by helping the other fellow a little that we shall help ourselves the most.

Cotton Bags Popular as Consumer Packages

Cotton is an important export crop. For many years the carry-over of cotton has been a problem. It is, therefore, gratifying to know that an increased domestic use for cotton is reported by the Bureau of Agricultural Economics.

They note that consumer packaging of farm products in cotton bags has been increasing rapidly. More than 10,000,000 cotton bags were used in 1932 in consumer packaging of potatoes. In 1928 only about 500,000 cotton bags were used for this purpose.

In a printed pamphlet just issued on the subject the Bureau says that cotton bags make attractive packages; they supply a suitable surface for brand names and make possible effective advertising; they are durable and little affected by moisture; they represent minimum tare weight; and they have a high salvage value.

In connection with its researches looking toward increased use of cotton, the bureau, in cooperation with North Carolina State College developed a duplex cotton fabric that has open-mesh and close-mesh sections, the open-mesh section permitting consumer inspection of the contents of bags made of this fabric, and the close-mesh portion providing a surface for brand names.

A survey by bureau representatives recently disclosed that farm products in consumer-size cotton bags are being received in a large number of markets. Some wholesalers and retailers said they believe that the small cotton bag is rapidly becoming the principal type of container for merchandising potatoes, onions, and citrus fruit.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Commercial Fertilizers—Report for 1933," Agr. Exp. Sta., New Haven, Conn., Bul. 355, Oct., 1933, E. M. Bailey.

"Report of Analyses of Commercial Fertilizers," Dept. of Agr. and Immigration, Baton Rouge, La., Fert. Dept., Season 1932-33, Harry D. Wilson.

"1933 Fertilizer Analyses and Registration," Dept. of Agr., St. Paul, Minn., H. A. Halvorson.

"Analyses of Commercial Fertilizers, Fertilizer Supplies, and Home Mixtures for 1933," Agr. Exp. Sta., New Brunswick, N. J., Bul. 557, Nov., 1933, Charles S. Cathcart.

"Commercial Fertilizers in 1932-33," Agr. Exp. Sta., College Station, Tex., Bul. 487, Dec., 1933, G. S. Fraps and S. E. Asbury.

"Effect of Manure and of Phosphorus Fertilizer on the Yield and Composition of Alfalfa Hay," Agr. Exp. Sta., Logan, Utah, Bul. 247, Jan., 1934, D. W. Pittman.

Soils

"Soils of Henderson, Hidalgo, Milam, Nacogdoches, Navarro, Wichita, Willacy, and Victoria Counties," Agr. Exp. Sta., College Station, Tex., Bul. 482, Oct., 1933, G. S. Fraps.

"The Effect of Different Colloidal Soil Materials on the Efficiency of Superphosphate," U. S. D. A., Washington, D. C., Tech. Bul. 371, July, 1933, Philip L. Gile.

"The Decomposition of Hydrolytic Peat Products Including Ammoniated Peat," U. S. D. A., Washington, D. C., Tech. Bul. 389, Oct., 1933, I. C. Feustel and H. G. Byers.

"Report of the Chief of the Bureau of Chemistry and Soils, 1933," U. S. D. A., Washington, D. C., Henry G. Knight.

Crops

"Aiding Arizona's Agriculture," Agr. Exp. Sta., Tucson, Ariz., 44th Annual Report for the Year Ending June 30, 1933, P. S. Burgess.

"The Forty-sixth Annual Report of The Colorado Agricultural Experiment Station For the Fiscal Year 1932-33," Agr. Exp. Sta., Fort Collins, Colo., E. P. Sandsten.

"Wheat Production in Colorado 1926-1932," Agr. Exp. Sta., Fort Collins, Colo., Bul. 404, Sep., 1933, D. W. Robertson, Alvin Kezer, J. F. Brandon, J. J. Curtis, Dwight Koonce, and Wayne W. Austin.

"Dormancy in Small-grain Seeds," Agr. Exp. Sta., Fort Collins, Colo., Tech. Bul. 5, Aug., 1933, G. W. Deming and D. W. Robertson.

"Pasture Investigations (Fifth Report) A Resume of Thirteen Years of Research," Agr. Exp. Sta., Storrs, Conn., Bul. 190, Aug., 1933, B. A. Brown.

"Report of the Director for the Year Ending June 30, 1933," Agr. Exp. Sta., Storrs, Conn., Bul. 192, Sep., 1933, W. L. Slate.

"Report of the Director, Agricultural Extension Work in Indiana, July 1, 1932, to June 30, 1933," Purdue Univ., Lafayette, Ind., J. H. Skinner and T. A. Coleman.

"Chemical Composition of Herbage from Massachusetts Pastures," Agr. Exp. Sta., Amherst, Mass., Bul. 300, Oct., 1933, J. G. Archibald and E. Bennett.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., Vol. 16, No. 2, Nov., 1933.

"Fifty-fifth Annual Report of the North Carolina Agricultural Experiment Station For the Fiscal Year Ending June 30, 1932," Agr. Exp. Sta., State College Sta., Raleigh, N. C., R. Y. Winters.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XIX, No. 166, Jan.-Feb., 1934.

"Biochemical Investigations of Certain Winter Pears," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 316, June, 1933, James C. Moore.

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Surveys Point Way to Improved Cotton Crop

(Farm Science State by State—SOUTH CAROLINA)

Given a true picture of the kind of cotton it was growing, South Carolina, in 1928, started a systematic campaign to increase its output of longer-fiber cotton. The success of the campaign is shown by the drop in the production of excessively short-fiber cotton from 11.2 per cent of the 1929 crop to less than one half of 1 per cent of the 1932 crop. Aside from the actual dollars-and-cents value of this improvement, South Carolina has profited greatly by the improvement of the general attitude toward its cotton.

For generations preceding the World War, American cotton had an enviable reputation in world markets. The decade which followed the war, however, saw some of this prestige lost. With high prices for all cotton and the problem of making crops in competition with the bollweevil, the main consideration was to make cotton—not necessarily to make it good. The planting of varieties of inferior staple increased greatly because they matured early. The decline in staple quality of American cotton which followed became the subject of common discussion among cotton people at home and abroad. By 1927 the situation had become so serious that Congress directed the United States Department of Agriculture to set up machinery for assembling thoroughly

and systematically facts on the grade and staple of the crop. With the aid of the State experiment stations, the cooperation of a great number of gins, representing production over the entire cotton belt, was obtained.

The early results of the work disclosed the presence of enough cotton of inferior staple to cause concern, but they also revealed the places where efforts for improvement could be concentrated for best results. Planters in areas that were raising excessively short-fiber cotton have followed the plans suggested by Federal and State specialists to raise the State's average, largely through planting pure seed of selected varieties.

The correlated results of the surveys have charted the way to better cotton and mirrored the progress made in each section. Figures thus obtained show that cotton has gained about one thirty-second inch in fiber length for the country as a whole and one sixteenth inch in South Carolina.

Cabbage Seed for Nation Comes from Small Area

Most of the cabbage seed produced in this country comes from the Puget Sound region in western Washington. In recent years commercial production of cabbage seed has shifted more and more to the Skagit Valley, a relatively small area only a few miles south of the Canadian line where growers make a business of this specialty.

Lack of rainfall in the growing season is ordinarily considered a serious handicap in farming, but in the Skagit Valley it seems to be the secret of success, the factor that gives these growers an advantage over competitors. Two of the most serious diseases affecting cabbages are known as black leg and black rot. Seed from the Skagit Valley has usually been free from infection.

J. C. Walker of the United States Department of Agriculture has discovered that the organisms that cause these diseases are usually carried from infected plants to healthy plants by the splashing of rain, and rarely if ever through the soil or by the wind. The Skagit Valley has an adequate supply of moisture but it rarely rains in the months from May to September when cabbage is maturing. This accounts for the fact that seed produced there is free from these two serious cabbage diseases.

Potash Hunger Follows Legume Hay Crop

(*From page* 11)

cotton wilt in a large number of cases.

Since cotton "rust" and cotton wilt are apt to be especially severe when the potash of the soil has been removed with legume hay, the cotton farmer on the sandy alluvial soils of the South is finding that by a proper adjustment of his fertilizer applications to supply the depleted potash, and if necessary phosphorus, of the soil he is able to control both "rust" and cotton wilt. At the same time, by restoring the balance between nitrogen on the one hand and potash and phosphorus on the other, he can secure the full benefits of the nitrogen reserve in the soil built up by the nitrogen-fixing bacteria of the legumes.

Fertilizing the Lawn

(*From page* 22)

ash, but relatively high in nitrogen, is to be recommended. Most fertilizer dealers can supply such mixtures as 4-8-4 or 5-8-5 which are fairly well suited for seeding-down treatment. This fertilizer should be worked into the top inch or two of soil before seeding the grass or if the grass already has been seeded the fertilizer can be applied as a top-dressing and thoroughly wet down to carry it as much as possible into the soil.

For Different Plants

As a rule large amounts of phosphate and potash encourage the growth of clovers, while large amounts of nitrogen encourage the growth of grasses like blue grass, bent grass, timothy, red top, and fescue.

One of the best guides to follow in determining the need of nitrogen is that of leaf color. Lack of important plant food is nearly always manifested by light green or yellowish-green leaf color. Its abundance generally is indicated by dark green color of leaves and in the case of most grasses, dark blue-green color. This indicates health and vigor and is greatly to be desired.

The use of additional nitrogenous fertilizers such as sulfate of ammonia or nitrate of soda will bring up the nitrogen content and further favor growth of grasses. Later fertilization may consist chiefly of sulfate of ammonia or nitrate of soda alone, but it should be kept in mind that lawn crops, like all other crops, require phosphorus and potassium as well as nitrogen. An annual spring application of a good complete mixed fertilizer, containing nitrogen, phosphate, and potash, and frequent light applications of nitrogenous materials later in the year often are found to be the best fertilizer treatment for lawns.

In applying all fertilizers, it should be remembered that they are largely inorganic salts of high concentration and capable of "burning" the grasses if improperly applied. If possible, scatter the fertilizer just before or during a rain, or follow the application by thorough watering. Sprinkling is not sufficient, as it requires a real soaking to remove the concentrated plant food from the tender leaves of the grass and carry it into the soil. Care should be taken not to scatter fertilizer when the grass is wet with dew or rain since a small amount of moisture will partially dissolve the chemicals and result in "burning" of the grass.

With proper fertilizer treatment of the lawn, a number of desirable results may be expected: first, a decidedly darker green and more healthy color of the grass; second, a more rapid and vigorous growth; third, a deeper and stronger development of the root systems.

Deep, spreading root systems are especially desirable for the common lawn grasses since they are less affected by dry spells and consequently not so likely to require constant watering except in extended dry periods. Some may complain that fertilization makes it necessary to mow the lawn too often, but this is very desirable from the standpoint of securing and maintaining a thick stand and a heavy sod.

Lime for Clover

If clover is wanted in the lawn, an abundance of lime will be highly beneficial. Few of the ordinary lawn grasses are highly sensitive to slight or moderate soil acidity and are not greatly benefited by liming unless the soil is distinctly acid. It should be remembered that weeds like dandelions and plantain are checked by a fairly high degree of soil acidity which is not noticeably injurious to the growth

of bent grasses, fescues, and blue grass if sufficiently provided with plant food. Excessive acidity is detrimental to blue grass and clover and should be corrected by liming.

For Shrubs and Flowers

Use of fertilizer on plantings of shrubs and flowers is a somewhat different practice than in the case of lawns. In order to keep a mellow, friable surface-soil beneath such plants, well-rotted manure, lawn clippings, peat moss, or other forms of vegetation should be worked into the soil.

Ordinarily this will only partially take care of the plant-food needs of such plantings, and it is advisable to use additional fertility in the way of commercial fertilizers. For this purpose complete mixtures, bone-meal, dried sheep manure, ammonium sulfate, sodium nitrate, or others are used.

There are no definite rules as to the amount of fertilizer to apply, but from two to four tablespoons of a complete fertilizer high in nitrogen may be considered a moderate application for good-sized shrubs, rose bushes, or similar plants. With such materials as ammonium sulfate, sodium nitrate, or other quickly soluble fertilizer, smaller amounts should be used and applications made more frequently. The fertilizer is best scattered broadcast at a distance of several inches from the base of the plant and should then be incorporated with the surface soil by some sort of cultivation. Mulching with manure leaves may be done after the fertilizer is applied. The soil then should be thoroughly soaked.

Saving Hungry Soils

(*From page* 21)

visit a few of the farms where our recommendations have been put into practice, where farmers have followed our advice and have gotten results, we know that the influence of our extension work and educational service is being felt.

This past year we have tested in our laboratories over 4,000 samples of soil, and have reported our findings to the farmers who sent in these soil samples. Thousands of samples of soil have been tested in the field at our "soil-testing clinics" which are being held by county agents and Smith-Hughes teachers of agriculture in our high schools. We know that we are reaching, each year, thousands of farmers through this soil-testing service, and feel that it is a most effective means of actually getting farmers to carry out and put into practice our recommendations.

Due to unfavorable weather conditions for the past two or three years in the State of Wisconsin, our clover seedings have failed by hundreds of thousands of acres. Alfalfa seedings, however, have come through in most districts 100 per cent where the soils were properly fitted and fertilized. We have developed an acute feed shortage in many districts of the State. Prices for dairy products have fallen to very low levels. Farmers have found it difficult to buy feed. But in the face of all these obstacles, the dairy farmers of Wisconsin are making a supreme effort to increase their acreage of alfalfa and thus cut their feed costs.

This spring will see the largest acreage of alfalfa seeded on Wisconsin farms in history. In fact, we expect to see alfalfa in Wisconsin go over the million-acre mark in 1934. Farmers have found that alfalfa, with its long, deep roots, will stand drought and make satisfactory yields of hay in spite of dry weather, if fertility conditions are favorable. I estimate that better

than 500,000 tons of lime, marl, and paper-mill lime refuse will be used this year in fitting new fields for alfalfa. We have stressed the importance of soil fertility and plant food along with our lime-alfalfa campaign. "Have your soils tested first" is our slogan. We are now testing for available phosphorus and potash as well as acidity.

A Good Investment

Some farmers argue that they can't afford to buy fertilizers or lime, and yet many of these same farmers are spending half of their milk checks every month for feed. I argue that it is better economy to spend a little money for fertilizers and lime and grow this feed right on the farm than to spend so much for purchased feeds. A dollar spent for fertilizers will frequently come back tenfold.

Right now dairy farmers are being offered the greatest inducement in history to grow a few more acres of alfalfa. We are advising our Wisconsin farmers who qualify under the corn-hog program to use the money they get out of their contracted corn acres and buy alfalfa seed, lime, and fertilizer. Think of it! Here the government comes along and tells the farmer that if he will cut down 20 per cent on corn, that it will not only buy the alfalfa seed, but will give him enough money to buy sufficient lime and fertilizer for an equivalent number of acres of alfalfa. Here is the opportunity we have been waiting for for years,—and in the hilly, rolling districts of Wisconsin this corn, corn, corn-silo business has about wrecked these farms. It is about time we seeded some of these hillsides to alfalfa, and thus keep our soils at home. Another 25 years the way some of these farms have been handled, and there wouldn't be any soil left on these hillsides. A little verse comes to my mind which tells this story pretty well:

Countless worn-out farms remind us
We must farm our soils to stay,
And departing, leave behind us
Fields that have not washed away.
When our sons assume the mortgage
On these farms that had our toil,
They'll not have to ask the question,—
"Here's the farm, but where's the soil?"

And the program for cutting down our dairy herds is going to offer about the same inducements. In my opinion it would be good business to sell some of the scrub boarder cows and buy fertilizers with the money, and now the government is proposing to pay a bonus on every cow sold, in the pro-

Barley responds to fertilizer.

Left—200 lbs. of 0-20-20 **Right—no treatment**

The fertilizer increased the yield 20 bushels per acre. The field, on the farm of Albert Radicle, Hortonville, Wisconsin, hadn't grown a satisfactory crop in 20 years. It is typical of the potash-hungry soil in western Outagamie county, Wisconsin—black, level sandy loam, high in lime, low in potash and phosphates.

gram to cut the dairy surplus. This will enable farmers to feed the balance of their herds better. Why not take the bonus money and buy lime and fertilizers and plant more acres of alfalfa?

The Good Will Survive

I know that a lot of people are saying that this triple A program is simply paying farmers to become more efficient, and that the net result will be as much produce as ever. But even if their prophecies come true, we certainly will have accomplished something if we cut our costs of production. Wisconsin farmers have been spending twenty to thirty million dollars a year for feed. This bill should be cut in half by growing more of the protein feed on the farm. Dean Chris L. Christensen of the Wisconsin College of Agriculture recently said, "We have learned to grow two blades, and now perhaps we must learn to grow three blades on a restricted acreage."

When it is all said and done, the good farmer is the one who will survive. The government doesn't propose to subsidize the inefficient farmer. When government aid has been withdrawn, we all know that the farmer who has been doing a good job of farming will stay in business; but the man who has taken the government aid and squandered it, and lived along in his shiftless way, will find himself in a tough spot when he falls back on his own resources.

Soil fertility is the key to prosperity. We have been living on our fat for the past few years, but right now we are getting down pretty low on our reserves. There are thousands of acres of hungry soils in this State, soils that have great potential capacity, and yet they are only producing 50 per cent yields. On many of these soils, lime is the first weak link; on others, phosphates are needed; but more and more we are finding that potash, in addition to lime and phosphate, is needed to balance fertility, not only on the sands, black bottom loams and sandy loams, mucks, and peats, but even on our upland silt and clay loams. Potassium is the vitalizing element that makes our deserts bloom and our black bottom soils bound back with bumper crops.

Farmers find it necessary to repair their machinery when it breaks down. Why not repair our soils? My motto is, "Repair the soil first." And really it is not a repair charge, but rather a permanent investment when we buy lime and fertilizers for our dairy farms. While it is true that the sale of farm produce does remove some plant food, yet every ton of lime, phosphate, or potash that is applied to the farm becomes a part of the fund of circulating currency, where crops grown are fed, and the manure returned to the land.

Soil Banks

There was a time when farmers thought it was good business to take the earnings of their farms and invest this money in bonds and other securities. I know a farmer who for years has been doing this very thing, but many of these 7, 8, and 9 per cent interest rate securities have defaulted. In fact, this farmer has lost close to $20,000 in the past five or six years in some of his bad investments. But right on his farm, through demonstrations, I have shown that it was possible to invest in potash and other fertilizers, and not only recover the principal, but make 200, 300, and 400 per cent interest on the investment. Is there any bank in which we may invest our money that is more secure than the soil? My advice to farmers is that if you bank in the soil, you will have soils you can bank on.

HELL RAISER

Tough Soph: "Rat, you are about the greenest thing I have ever seen. Why look at the hay seed on your coat."

Meek Rat: "Them ain't hay seed, wise guy, them's wild oats."

Growing Importance of Potash in the Corn Belt

(*From page* 16)

been used previously but left off when there was no money to buy.

The financial stringency also resulted in a demand for lower ton cost of fertilizer and some tendency to meet price competition by lowering the analysis. Unfortunately potash usually suffers a greater proportionate cut than phosphate in this situation especially where small grain is to get the fertilizer. It is hard to justify higher analyses of potash for small grain alone as there is relatively less response to them. However, it should be remembered that corn is our big crop and agronomists insist on potash in wheat fertilizer for the crops that follow.

The fertilizer attachment on the wheat drill is the practical and cheap way of getting the potash distributed throughout the root-feeding area for the benefit of both the clover and corn crops. For the portion applied in the row or hill for quick action on the young plants, both phosphate and potash act as "starters" in developing vigorous young plants.

Of the upland soils, the gray flats and high-lime black sandy loams are the first to show acute need for potash for corn production. The rolling soils are subject to erosion which uncovers new layers of subsoil potash and this subsoil potash is available to plants, especially to vigorously feeding legumes like sweet clover, soybeans, and lespedeza. Highly efficient nitrogen gatherers, of which sweet clover is an outstanding example, contrary to the opinions and theories of a generation ago, seem to hasten the time when commercial potash must be added to the soil-management program in order to maintain or increase corn yields over a long period of years. This is especially true on the more level areas where there is little erosion to uncover new subsoil layers and crops are obliged to continue to take their supply of food from the same surface.

The livestock man who conserves and distributes manure in an efficient way has less need to be concerned about his potash supply than his neighboring grain farmer on the same type of soil. However, on fields far removed from the buildings and on farms with little stock to insure a reasonable manure supply, the efficient allotment of funds for purchase of supplemental mineral plant food will, on many of our long-cropped Corn Belt soils, include an increasing ratio for potash.

The Inquiring Mind

(*From page* 14)

a thing of interest, he said intuitively, "What can I say about it?" Thus he came to put his ideas and impressions upon paper, and did so in effective and convincing style. He also became a fluent speaker and always was interesting as a ready conversationalist. During his service time in the army, he began writing letters to the "Cincinnati Gazette." This gave him his first experience in newspaper work, and his accounts of the battles in which he fought attracted wide attention because of their accuracy and clearness

of description. Accuracy, indeed, was one of his most creditable attributes. He loved the truth and showed sterling integrity in all of his undertakings.

Turned to Agriculture

It was, however, agricultural writing that engaged his best efforts. On the home farm he had seen much of the primitive methods of farming, and so he early advocated improved machinery for the farmer. He lived to see this become available and used on practically every farm in the land. Too, he worked for better labor-saving equipment in the farm home, for he considered that of as great importance as better implements for work in the barn and in the field.

Following his bent for farm paper work, in 1865 he became an editor of "The Western Rural" which at that time was published in Detroit, Michigan. In 1868 Milton George, proprietor of the paper, moved the office to Chicago. Morrow went with him, but soon decided to branch out for himself; therefore in 1869 he went to Madison, Wisconsin, and there became publisher and editor of "The Western Farmer." As the paper did not prove financially successful, he rejoined Milton George on "The Western Rural" until in 1876 a new opportunity presented itself, and he served for one year as professor of agriculture at the Iowa Agricultural College at Ames, Iowa.

In 1877 he assumed a like position in the University of Illinois at Champaign. In 1881 he took direct charge of the University farms, and in 1888 became the first agriculturist of the reorganized experiment station. There he remained as Director of the Station until 1894, when he resigned and in 1895 went to the Agricultural and Mechanical College at Stillwater, Oklahoma, to organize its experiment station. He expected this appointment to be temporary, but soon he was made President of the College and Director of the Experiment Station and served in that position until June 1899. Then, being in ill health, he resigned and went to live on his 212-acre farm near Paxton, Illinois, where he died on March 26, 1900. He was buried at Mt. Hope Cemetery in Champaign, Illinois. The funeral service was held in the Presbyterian Church, at Champaign, of which he had been a devout member, elder, and Sunday School Superintendent for many years. The respect in which Professor Morrow was held was evidenced by the great number of leading citizens, professional associates, acquaintances, and local farmers who attended the service.

A Livestock Judge

Professor Morrow was an ideal gentleman in every sense of the word, yet not proud or austere. Indeed, he was remarkably affable, readily made friends, retained them, entertained them as a story-teller, and imparted valuable information on the various subjects which had engaged his attention. He was an admirable judge of livestock and often served in that capacity at the Illinois State Fair. In memory, we can see him at work, tall, slim, exceedingly active, and striving to the best of his ability to render honest and impartial decisions in the judging ring.

In Great Britain, perhaps it was, that he noted the judges weed out the less excellent animals in a large class of cattle or horses, relegate them to the "gate," and thus set apart a "*short leet*" from which they finally selected the prize-winners. He was practically the first to inaugurate that practical way of judging livestock in America; and so painstaking and particular was he in his adjudicating work, that we have seen him return again and again to the discarded animals, and their disconsolate exhibitors, and make a last and even more careful scrutiny to make "assurance doubly sure."

Writing in 1895, that eminent scientist the late Dr. Thomas J. Burrill of the University of Illinois said of

Professor Morrow's standing as a scientific and practical agriculturist and educational worker: "In several respects he is the foremost man in the United States, in these lines, and in naming the foremost half dozen of our countrymen who stand highest in general among such specialists, there are few, I am sure, who would leave him out."

Relative to his ability as a speaker, Professor S. A. Forbes of the university wrote in 1895, "He has been, on the whole, the most effective farmers' institute lecturer we have had in Illinois." Professor Burrill was even more emphatic when he wrote, "As a speaker before agricultural societies, institutes, etc., he easily stands first of any in the Union." After Professor Morrow's death, the faculty of the Oklahoma Agricultural and Mechanical College adopted resolutions in which he was referred to as a "tower of strength to the great interest to which he devoted his activities as a scholar of wonderful range of learning," and they declared that "through all the future history of this institution his name will be honorably associated with its early struggles and triumphs."

Thoughtful of Others

Professor Morrow was not only affable and genial, but ever thoughtful of the feelings of others. He had a kindly regard for Professor Eugene Davenport, his successor as Dean and Director of the Illinois College of Agriculture and Experiment Station. When that able, practical, and aggressive educator, scientist, and executive arrived at Champaign, Professor Morrow used his best efforts in helping him to succeed. Dr. Davenport has told the writer that Professor Morrow was careful to have him on the ground in time for the local farmers' institutes and introduce him to the audiences in a most cordial manner.

He says, "Wherever Professor Morrow went, he took especial pains to speak well of me, as I heard from many a source. I said to him one day, 'Why do you say so many good things about me? You do not know me well!' His reply was characteristic of the man: 'Why, Professor Davenport, I want my successor to succeed,' all with that twinkle of the eye which I learned to know so well.

"Let's Take a Ride"

"As the spring and summer wore on, he would come often to the office, which I asked him to treat as his own, and say: 'You have done enough for one day. Let's take a ride.' His horse would be at the curb and he would head for some of his many friends in the region, all, I am bound to believe, for the sake of introducing me to his especial friends. He was a student of agriculture and a philosopher by nature and training. No one knew better than he that the current slogan, 'Illinois soils are inexhaustible,' was sadly untrue, so he began a series of rotation experiments in 1879. They are still in progress, and there corn is raised year after year with no fertilizer, also in rotation with corn and oats, and with corn, oats, and clover. These are the oldest agricultural plots in America.

"Besides these rotation plots," continues Dr. Davenport, "which were designed to test fertility questions, especially with reference to corn, which was but one of the crops in the Rothamsted experiments, he did much work relative to the methods of cultivation, and showed that the common practice of deep cultivation was wrong and that the shallower the better, so far as good crops were concerned. He was a pioneer in the attempt to put science to work on the farm. He paid the penalty of being a prophet a little before his time, but one cannot speak too highly of his ability and service. He belongs with Miles and Roberts and Stockbridge."

E. H. Farrington, Professor Emeritus of Dairying of the University of Wisconsin, was associated with Professor Morrow at the Illinois Experiment

Station in 1890, and esteemed him highly as a gentleman who had "nothing but the highest ideals in his head and in his daily life," and of whom Dean W. A. Henry of the Wisconsin University once said, "Morrow is a 'fine-haired' man." And he was!

Professor W. J. Fraser, of the University of Illinois College of Agriculture was a student under Professor Morrow for four years, and for a year worked with him as assistant agronomist before becoming an instructor in dairying. He considered Professor Morrow "a splendid man who possessed to a high degree that quality of sincerity and genuineness so much needed in the progress of the world today. He wasted no time in playing politics, and always gave his best, and did his best, for the benefit of Illinois farmers. He was very versatile, and took a keen interest in all matters of education and the upbuilding of the University, as well as being a great church worker."

"A Just Man"

The tributes we have cited as to the character and accomplishments of Professor Morrow would have pleased him during his life, although he did not try to curry favor or seek applause. Indeed, he was ever modest in his mien and associations with his co-workers and the public. As the time for his passing approached he said to a friend, "After I'm through with this life I'd rather it be said of me, 'He was a *just* man,' than anything else." That, we are sure, is the estimate of him remaining in the minds of those of his friends who remain, and recorded in the archives of the State he served so well.

"The memory of the just is blessed."

Some Soil Problems

(*From page* 19)

show the symptoms first. The striped leaf effect in the corn plant has long been observed by many farmers who did not know the cause.

Hunger Signs on Velvet Beans

Both magnesium and potash deficiency are noted in velvet beans, the center leaf showing typical green veins with the yellowish-white areas between, with dying of the leaf margins.

Magnesia hunger can be very easily remedied at little cost and thus large annual loss to farmers saved. Briefly here is the remedy suggested by Dr. Cooper and Dr. W. D. Moore of the South Carolina Truck Experiment Station.

Magnesium can be added to the soil in various forms, as in dolomitic limestone and sulphate of potash-magnesia. It would be advisable to have half or more of the potash in truck fertilizer for light gray sandy soils derived from sulphate of potash-magnesia and use a fertilizer which contains dolomitic limestone rather than sand or other inert material as a filler. This will usually correct the magnesium deficiency for a single crop or for one year.

If the soil reaction is around pH 5.00 or below, it is advisable to make a broadcast application of 1,500 to 2,000 pounds of dolomitic limestone per acre. Oyster shell is of little value in controlling magnesium deficiency; it often makes the deficiency more severe.

Basic slag has been found to be one of the most satisfactory materials to stimulate crop production on certain unproductive soils. It is advised that this material be applied at the rate of 400 to 1,500 pounds per acre. Basic slag contains magnesium, manganese,

and iron in addition to the phosphorus. The phosphorus in basic slag is usually sufficiently available for grain crops, but it is not advisable to depend upon basic slag as a supply of phosphorus for delicate-feeding vegetable crops. It would very probably be best for most truck growers to make a broadcast application of basic slag in a similar manner to lime applications, and use the customary fertilizer analyses applied to various crops.

Manganese Deficiency

As with magnesium, so with manganese. Many common farm crops are grown on the gray soils of the lower Coastal Plains with not enough available manganese for normal growth. Oats, corn, peas, beans, and the various commercial truck crops suffer thus. The manganese deficiency symptoms usually appear first on the top and younger leaves, but otherwise the same as in magnesium hunger.

In cabbage, one of the important truck crops of the areas under consideration, the manganese deficiency is apt to show up on soils which have received large amounts of limestone or oyster shells. The cabbage plants on such soils are often dwarfed and yellowish white, the areas near the leaf veins being light to yellowish green. The deficiency is likely to show up also on any strongly acid soil which is poorly drained.

For remedy around 100 pounds of manganese sulphate per acre is found to be most effective. The manganese may be added also in the form of basic slag, but it takes heavy applications to supply sufficient manganese.

Avoid Overliming

South Carolina experience warns against overliming of truck soils, which leaves a condition worse than that of high soil acidity.

Where a soil is overlimed, it requires several years for it to come back to normal production unless it is given a special fertilizer treatment. Manganese and perhaps iron in certain cases are rendered less available by liming and they have to be added to the soil for the production of profitable crops.

Ordinarily it is not advisable to add more than one ton of limestone per acre for most vegetable crops unless the soil reaction is definitely known, the specialists find. Occasionally it is necessary to apply two or three tons of limestone to certain acid soils, but it is desirable to have the soil tested before large amounts of limestone are applied.

Recent Developments in Fertilizing Muck Soils

(*From page* 10)

types is neither so high nor so available, most crops on this type of muck will show a response to nitrogen in the fertilizer mixture, until lime has become well mixed with the soil to considerable depth. On the less acid mucks (Group 2), the response to nitrogen will be governed by the extent of drainage, the cropping age of the muck, by the time of planting and temperature of the soil, and by the type of vegetative growth of the crop. In general the higher the water-level and the older the muck, the greater will be the response to nitrogen. Early crops, grown while the soil is cold, and leafy crops, such as celery and spinach, are also usually benefited by nitrogen in the fertilizer mixture. On the alkaline mucks (Group 3) nitrogen is generally beneficial for early crops and leafy crops.

With the exception of a district in northwestern Minnesota which is benefited by phosphate alone, all mucks require potash and most of them phosphate, especially when intensive farming is being practiced. Although a fair yield of general crops is sometimes secured without fertilization for one to three years after reclamation, the production of special crops generally requires immediate and heavy fertilization for the first crop. This is especially true if several crops of wild hay were removed or the land pastured for several years before the muck was first broken.

Rate of Application

The rate of application of fertilizers required depends on the kind of crop being grown, and the closeness of planting, on the method of application of fertilizer, on the amount of fertilizer applied in preceding years, and on the percentage of plant food in the mixture applied. Thus a celery crop requires from two to three times as much fertilizer as does the spinach crop; and the celery crop will require at least a third more, if the rows are 30 inches, than if they are 48 inches apart. If the land has been heavily fertilized for several years, a considerable reserve in phosphate and some reserve in potash have been built up in the soil, and the rate of application can be somewhat reduced. Yet it is false economy in muck-land fertilization to omit or to greatly reduce the annual fertilizer application. Recommendations for the various crops are given in Table 3.

If the fertilizer is applied broadcast on the surface, it should be thoroughly disced in. It also may be applied with a seven-inch fertilizer disc drill to a depth of three or four inches, or it may be partly or wholly placed in the row. Generally the application with a disc drill gives better results than does the broadcast application disced in. If the row application is used, the rate of application can be somewhat reduced; in fact, a heavy row application is not advisable because of danger of injury to seed or to transplanted plants. The row application is not advisable if the muck is quite sour or if it is at all droughty. If the muck is not more than slightly acid and is well supplied with moisture, a light application of fertilizer, applied in the row not less than two inches from and preferably below the seed and not later than one week before transplanted crops are to be set in, is

Timothy and alsike clover on deep muck. Unfertilized in the foreground and fertilized with 275 pounds per acre of an 0-8-24 mixture beyond the stakes.

TABLE 3—FERTILIZER RECOMMENDATIONS FOR MUCK SOILS[4 5]

Crop (Where two fertilizer analyses are given, the first is generally preferred)	Annual broadcast application Pounds per acre: If only muriate of potash is needed, one-half to two-thirds these amounts should be applied.	TYPE OF MUCK			
		High-Lime Muck			Low-Lime Muck
		Deep and Medium Muck Properly drained, not acid to strongly acid.		Shallow Muck, "Alkali" Muck, or Poorly drained muck	Very strongly acid in reaction. Limestone or marl should be applied preceding fertilization.
		Mucks requiring both potash and phosphate.	Mucks showing little benefit from phosphate in mixture.		
		3-9-18	3-9-18	3-9-18	3-9-18
Lettuce[1 2] Spinach[1 2] Swiss chard[3]	500-1000 400-800 500-1000	Broadcast and disc in fertilizer before seeding. Side-dressing of available nitrogen fertilizer, at rate of 75-100 pounds, sometimes advisable during growth.			
Beets, Early[3] Celery, Early[1 3]	600-1000 1000-1800	3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18	3-9-18
		Row application advisable for beets—not more than 500 pounds 2 inches below seed. Broadcast remainder and disc in before seeding.			
		If no manure has been applied for celery, side-dressing of available nitrogen fertilizer is often beneficial in cold or wet periods during growth. If manure has also been applied, no nitrogen is needed in the fertilizer mixture.			
Beets, Late[3] Celery, Late[1 3]	600-1000 1200-2000	0-8-24	0-8-32	3-9-18 or 2-8-16	3-9-18
Early		3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18 or 2-8-16
Radishes[1 2]	400-800	Apply with fertilizer drill or broadcast and disc in before seeding.			
Late		0-8-24	0-8-32	0-8-24	0-8-24
Cabbage[2] Cauliflower[2]	500-1000 800-1500	For cabbage and cauliflower, application of 400-500 pounds may be made in row 4 inches deep, if plants are transplanted to field. Broadcast remainder and disc in.			
		3-9-18 or 2-8-16	3-9-18 or 2-8-16	3-9-18	3-9-18
Onions[1 2]	600-1200	Row application of 300-500 pounds 2 inches below seed advisable for onions. Broadcast remainder before seeding and disc in. Seed early if possible. Protect from wind to save crop and fertilizer. For further information see Extension Bulletin 123.			
Mint[2]	250-500	Fertilizer needed to maintain stand of mint, as well as to increase oil content. Apply broadcast fairly early in spring.			

Oats (With or without seeding)	250-400	To secure satisfactory results from fertilizers, grow grain varieties adapted to muck land, such as Gopher oats, Peatland barley, and Rosen rye.
Barley (With or without seeding)	250-400	
Rye (With or without seeding)	200-350	
		0-8-24 or 0-8-32 | 0-8-32 or Muriate of Potash | 0-8-24 or 0-20-20 | 0-8-24 or 3-9-18
Field corn	250-500	If row application is made for corn, do not use more than 200 pounds, preferably below and 2 inches from seed. Broadcast remainder and disc in.
Sweet corn	400-800	
Sunflowers	250-400	
Potatoes[1] [2]	400-800	Row application sometimes advisable for potatoes but not more than 400 pounds, preferably in furrow 2 inches below seed. If mixed with muck with machine planter, 600 pounds can be safely applied. Plant close to avoid hollow heart and to minimize frost danger.
Timothy and alsike	200-350	Seeding hay without nurse crop often advisable. Early seeding necessary to beat weed growth.
Sweet clover	200-350	
Reed canary grass	300-400	
Hungarian millet	200-300	
Permanent pasture	100-200	Apply broadcast on pasture in spring. Growth increased and palatability and nutritive value of grass much improved by proper fertilization.
		0-8-32 or 0-8-24 | Muriate of Potash | 0-8-24 | 0-8-24 or 3-9-18
Sugar beets[2] [3]	400-600	Row application advisable for sugar beets, not more than 150 pounds with seed, or not more than 300 pounds if 2 inches from seed. If more is to be applied, broadcast it and disc in before planting.
Mangels[3]	300-500	For root crops, apply with fertilizer drill, or broadcast and disc in before seeding.
Parsnips	600-1000	
Rutabagas and Turnips	300-500	
Stock carrots	300-500	
Table carrots[2]	400-800	
		0-20-20 or 0-8-24 | 0-8-24 | 0-20-20 | 0-20-20
Beans	250-500	These crops easily killed by frost, therefore generally not safe on muck soil. Keep soil compact to help prevent frost injury. See "Prevention of Frost Injury to Muck Crops," in Mich. Quarterly Bul. Vol. XVI No. 2.
Cucumbers and Melons	400-800	
Pumpkins and Squash[1]	300-600	
Tomatoes[2]	500-1000	

[1]These crops likely to show marked response to sulphur when grown on "alkali" muck.
[2]These crops may respond to copper sulphate when grown on acid muck.
[3]If muck has not been heavily fertilized in past, these crops are likely to respond to salt in fertilizer mixture.
[4]From Michigan Cir. Bul. 53 revised, "Fertilizer Recommendations for 1932."
[5]Fertilizer mixtures having the same ratios as those recommended, but of higher or lower analysis, would be equally desirable, a proportionately smaller or larger amount per acre being needed by the crop.
[6]Because of a limitation in the number of fertilizer analyses manufactured, by action of the fertilizer code agreement of the N. R. A., the 0-8-32 mixture has been temporarily withdrawn from sale. As the value of this new higher potash analysis becomes more evident, it is probable that it will again be manufactured. In the meantime, the grower who needs more potash and less phosphate for his particular crop can get the benefit of an 0-8-32 analysis by mixing with or applying separately 160 pounds of 50 per cent muriate of potash with each 1,000 pounds of 0-8-24 used.

likely to give better yields than a broadcast application. Our recommendation is that the method be tried out in a small way before being adopted for an entire crop.

Summary

Advancement in the knowledge of the proper management of muck and peat soils during recent years has proved that fine yields of high-quality crops can be produced on these once-considered-worthless soils by the use of the proper mixture of mineral fertilizers, in conjunction with certain other mineral materials. The use of these other materials is dependent both on the type of muck and on the crop being produced.

1. *Types of muck.* The benefits to be derived from the use of commercial fertilizer on muck land is dependent on the type of muck to which it is applied. On the basis of the treatment necessary for securing the highest efficiency of the fertilizer applied, the mucks must be divided into three groups, according to the degree of acidity or alkalinity of the soil.

2. *Lime.* If applied to the very strongly acid mucks, having a pH of 4.5 or less, it is likely to greatly increase the yields of most of the special crops. If applied on the less acid or the "alkali" soils, it may result in decreased yields.

3. *Sulphur.* Its application to correct the reaction of "alkali" muck is especially beneficial to such crops as onions, spinach, and lettuce and if the soil is quite alkaline (pH 7.5 or more) to a number of other crops.

4. *Copper Sulphate.* Its use in small quantities, in addition to regular fertilization, has produced marked increases on the previously limed very acid mucks with nearly all crops grown, and on the less acid mucks (around pH 6.2 or less) with a number of crops. It sometimes proves beneficial to spinach and lettuce on mucks that are slightly alkaline.

5. *Salt.* On mucks which have not been heavily fertilized for a period of years, an application, in addition to the fertilizer, is likely to prove beneficial to the four members of the beet family—mangels, sugar beets, Swiss chard and table beets—and to celery.

6. *Manganese.* This constituent appears limited in solubility in a few of the alkaline mucks, and generally can be corrected by correcting the reaction of the soil with sulphur. For that reason manganese sulphate cannot be recommended for use on muck soil except in exceptional cases.

7. *Fertilization.* The use of commercial fertilizers high in potash content is absolutely necessary for the production of good crop yields on muck soil. The fertilizer mixture and the rate of application needed are dependent on the type of muck, the method of fertilization, the past fertilization, and the kind of crop to be grown. While a row application is sometimes advisable, the proper method of application depends on the type of muck, the moisture supply of the soil, and the nature of the crop being fertilized.

Plans and Planners

(*From page* 4)

improvement. Hence we had scores of little haphazard capitalists in every township working like mad with inferior methods in an age when industry, commerce, and business perfected modern skill to the utmost. With nearly half the substantial element of the population limping along with low returns in proportion to labor and investment, the upward progress of the non-farm group could not keep on forever. On the whole, then, the

sages of the soil laboratory should have no regrets. They should pray to be alive when the fruits of Agadjustment are realized. But that time will be hastened with the help of forward minds, not with carping criticism or sneering jest. We cannot correct glaring evils by poking fun at experimental remedies.

Reaching out beyond the confines of the laboratory, the next step in soil improvement has been contributed by devoted persons who took the best and most practical findings of the scientist and labored to have them widely adopted by farmers. I like to compare the county agents to circuit riders and the branch station field men to country physicians.

IT is true that some men in those groups hardly merit such similes, but the ones I have known fortunately are worthy of high esteem. The branch station resident managers have been as zealous to cure the ills of their local soils as the average hard-working country doctor, and often with just about as much reward or encouragement. Their task has not been easy, for it is on their ground that must be fought out the nice balance between what the farmer can afford to do and what the ambitious commercial agencies insist should be done.

Resident soil doctors have lived hermit-like lives on rather barren spots, either on peat marsh or sand plain, following the trail of the submarginal refugee from the city who sought a haven pictured to him by some railway or lumber company prospectus. It may be our right at this time to question the sanity of spending public funds to colonize and develop such scrubby regions, but man must live somewhere in freedom, and it is just as sound philosophy to care for rural submergence as it is to go slumming and uplifting in city tenement districts. Even the Saviour found it not unworty of His precious time to work with fishermen when the fish did not bite. I reckon it is when the "fish don't bite" that we need somebody to help us spit on the bait, especially when we are so dry that we can't spit.

THE quiet enthusiasm of these sacrificing soil doctors has never received the plaudits given to polar discoverers or marathon dance champions, but methinks their contribution to net human welfare over the aching years has been considerably greater.

Other soil doctors whose lot has been cast in fertile valleys had a different job to do. Their task was to check the spendthrift, conserve rather than create soil fertility, and to teach the old lesson of leaving the land as good or better to the coming generation as the buffalo and the Indian left it. Perhaps theirs was a somewhat harder problem than the doctors who ministered to starving, depleted, forgotten, eroded townships. When a crop yield is minus and you find ways to increase it rapidly, greater headway is secured than when yields diminish imperceptibly before the eyes of smug yeomen following the moon-planting lore of their fathers on land originally deep and rich. In other words, it is easier to get a sick man to take medicine than it is to have a fat man take exercise.

The less deserving in the ranks of extension workers one need not spend much time to discuss. Some of these persons felt impatient over the failure of the well-spring of science to bubble forth with new streams of erudition each spring, and they balked at reviewing the old lessons. Instead of being willing to act as the handmaiden of science in soil improvement by slow and painful progress, such occasional persons in field service for the state desired to act as ballyhoo barkers and slap the gaudy canvas signs with buggy whips, to draw the gaping yokels around the side-show. If no new freak of nature or "wonder plan" could be unleased to draw the pack in hot pursuit, their day was

incomplete and their life work wasted. Unfortunately some of these arrant mountebanks found comfort in the attitudes of the least discriminating of the commercial clan with goods to sell. The louder they bellowed and megaphoned, the better these thoughtless camp-followers liked it. On the whole, be it said, the prudence of the more solid mercantile agencies supported the conservative element in extension.

SENDING to the jungles for wilder and woolier menageries to use as breath-taking marvels could not stand the ultimate pressure of utility. The commercial agent had his delicately balanced task as well in the face of such conditions.

There is an old adage "be not the first by whom the new is tried nor yet the last to lay the old aside." In getting fertility adopted by farmers, peculiar traits of character need to be recognized. The elements of competition, personal profits, and greater volume of production, not to mention the glory of being ahead of the field, can become dangerous in the extreme sense. With woeful absence of good records, farmers can be reached best in general terms of numbers and tonnages. In other words, *more* has always been a synonym for *good* among farmers. But the more they all got more, the more trouble ensued, measured in excess numbers and tonnages.

It is a pity that greater thought has not invariably been given to quality on the one hand and permanent year-in-year-out soil building on the other. Soil practice that has stressed the long-time effect, the accumulated benefits, the interest-bearing value of fertility rightly applied stands far in the front, while the fellows who counted numbers in the hill in 1930 and had to borrow the price of seed in 1933 belong to the misguided group.

AT the risk of being a bore, let me repeat that Agadjustment is not designed or directed with the intention of supplanting efficiency or making the work of the scientist and the extension man less necessary. This rests upon the fundamental factor which everyone engaged in this stupendous experiment fully recognizes.

This factor is as old as life itself and part of it. It may be stated in very simple terms. Man's activity and ambition never entirely cease under any circumstances short of complete paralyses, while he lives. Similarly, the minute and complex stirrings of life and change and progress in the soil never cease entirely save when some corroding chemical sterilizes it. You may tell a man not to grow this or do that and he will sign up cheerfully to comply; but an outlet must be found for his abundant energy of thought and action, and find that outlet he will regardless of consequences.

IN like degree, you may decide to abandon a piece of land and keep it out of cropping, but behold what nature does while you sleep off the jag! Tares and quack perhaps, but Mother Nature smiles just as broadly at the result and insists that she cannot be barren with such a bursting womb. And birds and bees, foxes and ants, stray animals and sundry crawling things imbibe some nourishment out of that which man insisted must remain unproductive!

Nature thus discounts man's unwitting contracts, but during the process there should be some educational result that brings social values and a greater sense of the unity of agriculture. If this is accomplished while we await a saner tariff policy, or other things you think are more basic than "basic commodities," it will not be a waste of effort to engage in Agadjustment.

So perhaps it is well to broaden out at this point and admit that probably the crux of our mutual problem lies on top and above the soil rather than in it. By this I mean no disregard for the needs of the soil or the virtue

of centralizing efforts upon the better lands rather than upon the lean ones. Rather I inquire, as you do, whether the task is not to understand and manage the affairs of mankind more equitably instead of poking our noses forever into test plots and auger holes looking for profits under the ground that cannot be fairly distributed above ground!

This is just as applicable to farm implement manufacture, housing, farm equipment, or any other line as it is with soils. Not until we join the ranks of the inquiring minds who are not satisfied that we can safely return to things as they were, will we be able to grow into the future.

WE may laugh it off and say that "noble experiments" die aborning, and that the ways of the past are the ways to follow still. They are—below the ground level, but not above it; they are—below the neck, but not above it! If man cannot rise to better ways of overcoming physical things and push upward all together to a better system, then what will the future hold for soil fertility?

Unless we measure our lives by racial and human welfare as we come out of this coma, what assurance have we that men will be able to retain and restore soil fertility—unless all the land comes under the sway of a few despots? And soil fertility has but one prime object, and that object is to provide food in abundance and clothing a-plenty. If there are few to buy the food and few to get the clothes, I see little value left in any soil.

Men pressed for meager necessities on farms postpone the restoration of their acres. "Women and children first" is not a slogan reserved for ships that are sinking! Common sense of the old school teaches us that much. That is no idle dream of Agadjustment theory.

IN the days of feverish settlement and national land expansion, our ancestors who grew restless and weary of cramped local life and opportunity could move onward to places where greater freedom existed to achieve better things. Largely they found the soils waiting them abundant and fruitful, responsive to crude husbandry, and rich in promise. In the zest of high adventure of this golden age of dross, such pioneer endeavor subsisted wantonly of the land's largess, just as it killed the pigeons and the bison by the wholesale. That started the neglect of things both above the ground level and below it. "Why not?" quote the ravagers, "the land area is limitless and we are the conquerors!"

Selfish profit motives ruined both the land and the tiller of land. Right now let us carefully observe the grave error in a common term.

Profit and expediency for the moment were the rule, and continued as the guiding principle even unto the smash! These forerunners of ours thought that individual profit piled away in sly places meant wealth that could be counted as national and permanent. If they had considered the way of the soil in that same sense, maybe the error would not have been committed.

You can take the richest fertilizer

mixture in the laboratory of modern science and apply it to a hill here and there in proper amounts and at proper depth, and then sit back and hope for universal benefit—but it never comes! Dribbling and dabbling in a small area of soil grains does not provide sustenance and chemical action enough to seep through the entire acreage. Everybody knows that, sure enough; but when you apply that thought to doses of selfish profits thrust into small personal ant hills, you get the same barren result for the whole acreage of human welfare.

AND as more accurate knowledge of soil fertility came, men comforted themselves at the size of their manure piles and the handy beds of marl. Out of the wealth torn from the soil they bought some chemical supplement perhaps, and put it into their own ant hills. The rest of them, and a sad majority they were as the lean years came, had no manure and no marl and nothing to salt the earth withal.

But now the age of colonization is over, unless we wish to trust our luck with Byrd on an iceberg. Men have come into their corner. At least in the temperate zones, where the do-ers reside. Man faces the status quo, and has to stand pat where he is whether he is a standpatter or not. He is right on the spot. The soil beneath his restless brogans is all he has left on which to do or die. All animal life comes from the plant, and all plants come from the soil. We are up against the majesty of fundamental laws in an age of social complexity.

WE have two roads to try out. One is a slippery concrete trail paved with the good intentions and taxes of the past, ending in a barricade and a red lantern marked "the end of human and natural resources." The other is a rather uninviting detour, winding and hilly, dusty and tiresome, giving us punctures and blow-outs, but which if persisted in will get us up, over, and beyond!

Better equalization of opportunity embodied in many of the strange new plans that are being evolved today will take shape before long. Wise doctors of men and of soils know the right prescription, or at least can advise the proper regimen to follow. At this juncture we stand in need of sage counsel like the man who has been sick abed, feels a gradual return of vitality, and wants to arise and put on his pants so that he may hustle once more for profits. Or like the lean soil that gets a spurt of animation from a green-manuring crop, not sufficiently balanced in the required mineral elements to last.

Personally I prefer to see us stick in bed awhile and take our medicine, along with a little exercise to try our muscles. The devil is never so tricky as when he is convalescent. It is so easy to rush back onto that inviting concrete road to chaos again. Voluntary discipline is so irksome! Planning together is not so much fun as cheating each other!

Let us hope that while men are resting from their profit orgies and some of the land is resting under Agadjustment a little horse-sense will teach us to say "Nay."

TODAY

Look well to this one day,
For it, and it alone, is life.
In the brief course of this one day
Lie all the verities and realities of your existence,
The joy of growth, the splendor of beauty, the glory of action.
Yesterday is but a dream, and tomorrow is only a vision,
But today well lived, makes every yesterday a dream of happiness.
And each tomorrow a vision of hope.
Look well, therefore, to this one day,
For it, and it alone is life.
Such is the salutation of the dawn.

—Translated from the Sanscrit.

NEITHER DO WE

Math. Prof.: "Now, Mr. Zilchguard, if I lay three eggs here and five eggs here, how many eggs will I have?"

Mr. Zilchguard (with a questioning glance): "I don't believe you can do it, sir."

Criticized for addressing his employer as Mr. 'Arrison, an East-end Londoner remarked: "Well, if a haitch and a hay, two hars, and a hi and a hess, a ho and a hen, don't spell 'Arrison, I don't know what does."—London *Tidbits*.

Florence: "Mama, do pigs have babies?"

Mama: "Why of course, my dear."

Florence: "Someone told me they had little pigs."

"Has George matriculated yet?" was the question put to Mrs. Newly-Rich, with a son at college.

"Oh, no," came the reply, "he's not at all that sort of boy."

LION HEART

"Now, Macpherson, why don't you fight against your longing for drink? When you are tempted, think of your wife at home."

Macpherson (thoughtfully): "When the thirst is upon me, I am absolutely devoid of fear."

Some men never appreciate their children so much as when making out their Income Tax.

INTUITION

Two Jewish businessmen were riding home from their stores, on the streetcar. Side by side they sat, both looking worried and both remaining silent. Finally one heaved a deep sigh. The other studied him for a moment and then said in an annoyed tone: "You're telling me?"

Johnny had an accident—his pants were torn. The teacher had just finished a temporary patch, when Johnny, always polite, murmured, "Thanks, teacher, I hope I can do the same for you sometime."

"Last night I was kissed twenty times in twenty minutes."

"By the same man?"

"No. He was a changed man after the first kiss."

Perplexed Male Shopper: "I want to buy a camisole or a casserole. I'm not sure which is the correct name."

The Clerk: "It all depends, sir, on what kind of a chicken you want to put in it."

ECONOMICS

Two Hill-billy farmers were discussing the P & L of Agriculture at the pig-sty.

"Zeke, that durn sow of yourn would fat up faster if you fed her more," said one.

"I knows it, Airy," Zeke conceded, "but my Gawd, neighbor—what's time to a hawg?"

KAINIT

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